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Needle stick injury and associated factors among health professionals in Degahbur and Kebridahar public hospitals, Eastern Ethiopia

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RESEARCH

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ABSTRACT

Background

Needle stick injury is the most common workplace related health hazards responsible for transmission of blood-borne pathogens.

Aims

The aim of this study was to assess needle stick injury and associated factors among health professionals in public hospitals in Degahbur & Kebridahar from February to September 2021.

Methods

A facility based cross-sectional study design was conducted From February to September, 2021. A total of 264 health professionals were drawn using simple random sampling technique. Data was collected by using structured self-administered questionnaire. Data analysis was done by using Epi-data version 3.1 then exported to SPSS version 21. Frequencies of variables were generated; tabulation and percentages were used to illustrate study findings. Bivariate and multivariable logistic regression was used to analyse the association between the dependent and independent variables.

Results

The prevalence of needle stick injury among health professionals was 107(40.5 per cent). Male (AOR=4.114 95 per cent CI 1.469-11.522), being unmarried, (AOR=4.919 95 per cent CI 1.695-14.279) and safety box turn out, (AOR=2.906 95 per cent CI 1.154-7.318) were significantly associated with needle stick injury.

Conclusion

The prevalence of needle stick injury among health professionals was high in the public hospitals. The hospital administrations should arrange training for health professionals to fill the skill gap, compliance with universal precaution and discourage recapping needles after use and ensure availability of safety box in the workplace to establishing better working environments.

Key Words

Needle Sticks Injury, Health Professionals, Ethiopia

What this study adds:

1. What is known about this subject?

Health professionals are at risk of acquiring life-threating blood borne infections through needle stick and sharps injuries in their work place.

2. What new information is offered in this study?

Evidence has been reported about magnitude and factors related to needle stick injury in public hospitals.

3. What are the implications for research, policy, or practice?

Institutional based interventions are needed; provision of necessary safety equipment and emphasize regular use of universal precautions during clinical activities.

Background

The National Institute for Occupational Safety and Health (NIOSH), USA defines a needle stick injury as injuries that are caused by objects such as hypodermic needles, blood collection needles, cannula and needles used to connect parts of IV delivery systems. Annually hundreds of thousands of health professionals are exposed to work related infections such as blood borne infection as a result of needle stick and sharp objects injury. Needle stick injuries are an occupational hazard for millions of health professional[1]. Occupational exposure to blood and body fluids is a serious treat for health care workers (HCWs) and poses a substantial risk of infection transmission including

the Human Immunodeficiency Virus (HIV), hepatitis viruses such as hepatitis B virus (HBV), hepatitis C virus (HCV), other viral diseases and infectious diseases. Each of these viruses presents a distinct threat to health professionals. Approximately 3 million HCWs are exposed to blood borne viruses each year globally, from this 2 million, 900,000 & 300,000 were contributed to HBV, HCV & HIV respectively, 90 per cent of these infections that result from these exposures are in low-income countries[2]. Blood has been implicated as the source of the exposure in nearly all occupationally acquired infections. Exposures occur through needle sticks contaminated with an infected patient's blood or through contact of the eye, nose or mouth with the patient's blood[3]. More than 20 other infections can be transmitted through needle sticks, including syphilis, malaria, and herpes. In the USA, about 600,000 to 1 million NSIs occur per year, half of them are not reported[4]. Needle stick injuries are very common and, in many instances, unavoidable among healthcare providers when they are delivering patient care. In the healthcare sector, NSIs are one of the most preventable occupational hazards among healthcare providers[5]. The prevalence of NSI varies greatly across different countries and within the same country. In European countries the prevalence of NSIs was 42.5 per cent[6], and all health professionals are at risk. In England's National Health Services (NHS) the injury caused by needle stick 17 per cent and are considered to be the second most harmful medical event, negligence and carelessness of the personnel, not using safety precautions and lack of sufficient information and knowledge on the principle of prevention and protection against these types injuries were also reported as most important factors of needle stick incidence[7]. In Africa varies from 31 per cent to 68 per cent; it is 30.9 per cent in Southern Ethiopia, 52.9 per cent in Tanzania, 67.9 per cent in Alexandria in Egypt and 68 per cent Nigeria[8].

Needle stick accidents have an effect on not only the standard of care provided, but also the safety and well-being of health professional. The risk of needle stick injury is high for all health professionals who conduct procedures with sharp instruments; one of the risk factors for needle stick injury (NSI) is the risk of an unsafe injection that exposes the patient to blood and bodily fluids that lead to a risk of developing various types of infections and healthcare providers are always under serious threat nursing, laboratory workers and physicians are at risk whenever a needle or other sharp object is exposed. Underreporting of NSIs attributed that people who are exposed could not be given post exposure prophylaxis (PEP) at appropriate time to prevent the development of infection in the person who has experienced NSIs. For instance, PEP for HIV is shown to be 80 per cent effective in preventing the development of the infection[9]. According to Ethiopian Nurses Association in a few hospitals in 2007, the incidence of injuries caused by needles and other sharp medical devices is 35 per cent. In Ethiopia's Somali region, 30.53 per cent of HCWs reported NSIs. According to the report, 30.53 per cent of health-care staff sustained a needle-stick injury[10]. The magnitude of NSSIs among health care workers in different parts of the Somali region is found to be high and it varies from place to place. Therefore, the aim of this study is to assess needle stick injury and its associated factors among health professionals in public hospitals, Somali region, Ethiopia.

Method

The study was conducted in two public hospitals which are found in Degahbur & Kebridahar city, Somali region, eastern Ethiopia. Both cities have their own general hospital and health centers and employed 531 health professionals, Degahbur hospital had 307 and Kebridahar hospital had 224 health professionals. A facility based cross-sectional study design was conducted to assess prevalence and associated factors of needle stick injury among health professionals in Somali region, Ethiopia From February to September 2021. Health professionals (nurse, midwives & laboratory technicians) served in the selected public hospital for at least one year. Health professionals who were avail in the selected public hospital during the study period were included in the study.

The sample size for the study was determined using single population proportion formula. Based on the following assumption; 5 per cent marginal error (d), 95 per cent confidence level (alpha, 0.05) and prevalence NSIs (p=30.53)[10]. Then, correction formula applied and added 10 per cent non-response rate. Therefore, the final sample size was 264. Two public hospitals found in Degahbur & Kebridahar city were selected deliberately. Then population proportion size allocation was applied to select health professionals, based on the number of health professional staffs serving in each department (laboratory, emergency unit, surgical, medical, operation room (OR), obstetrics and gynaecology) the required sample size was drawn randomly by lottery method. The data was collected by using interviewer administered structured questionnaires. The data questionnaire was developed from the WHO/ICN tool kit injection safety and previous research studies done then modified based the objectives of the study. The questionnaire was designed to have four sub-topics. Namely, socio-demographic, behavioural, working environment and respondents' perceptions factors towards NSIs. The questionnaire was designed in English and translated to Somali and back to English to maintain

consistency. The data was collected by four nurses and regularly supervised by supervisor. The questionnaire was pre-tested in similar settings by the investigators before the data collection on 5 per cent of the total sample size. Before embarking upon data collection, the necessary arrangement and corrections of the questionnaire were made to standardize & ensure its validity before the data collection period. Data collectors were trained on about the purpose of the study, data collection techniques and procedure, questionnaire, sampling methods and securing informed verbal consent from the study participants prior to data collection period. Interviewers were supervised at the site and regular meeting was held between the data collectors and the supervisors to ensure the completeness & consistency of the gathered information.

Operational definitions

Needle Stick Injury (NSI): Is an injury caused by a needle point or sharp instruments during providing care to a patient.

Health Professional (HP): The term "health professional" applies people who are providing health care and employed in health facility who may be exposed to clinical treatment and medical sharp devices, such as needles.

Event Reporting Pattern: A written communication (report) between Health care workers and the agency using report format which is required when an accidental injury occurs.

Sleeping disturbance: Snoozing before or after receiving medical treatment (fall in sleep).

Personal protective equipment: Things that we wear, when doing any activity that could result in injury.

Work place supervision: Health and safety accountable bodies perform daily supervisions in the department and working room on a weekly, monthly, quarterly, and yearly basis.

Data were analysed using both descriptive and analytical statistical techniques with the help of SPSS for windows version 21. The dependent variable was dichotomized into those whose exposed needle stick injuries and those whose were not, for statistical analyses. Logistic regression model was applied for multivariate analysis to verify basic predictors of the needle stick injuries. Odds ratios and their 95 per cent Confidence Intervals (CIs) were calculated. Significance level of 0.05 was considered to determine the presence of association between groups of variables. Model fitness was checked using Hosmer and Leme show goodness test. Verbal consent was obtained from participants. Measures were taken to ensure the respect, dignity, and freedom of each individual participant in the study. Information was also kept confidential.

Results

A total of 264 Participants was involved in this study with 100 per cent of response rate. The majority of the respondents 166 (62.9 per cent) were between age group of 25-34 yrs with mean age of 25 years (SD±2.8). One hundred thirsty-five (51.1 per cent) of respondents were Male. Two hundred fifty-five (96.6 per cent) were Muslim. Regarding marital status of the respondents 178 (67.4 per cent) was single. The majority of participants identified as Somali 255 (96.6 per cent) in their ethnicity. Educational status of the respondents, 165 (62.5 per cent) were Degree and above. Regarding to profession/job category of respondents 176 (66.7 per cent) were Nurse. Majority of the respondents 194 (73.4 per cent) had work experience between (1-4) years with mean work experience of 1.27 years (SD±0.46 years). One hundred forty-three of the respondents (54.1 per cent) reported their income monthly salary was between (4500-5999ETB). (Table1)

Two hundred & fifty-two (95.5 per cent) of the respondents reported use personal protective equipments. Most of the respondents, 225 (85.2 per cent) never recap the needle after they use. Regarding chewing khat most of the respondent 241(91.3 per cent) never chewed khat. Two hundred fifty-six (97 per cent) of the respondents never smoke cigarettes. Two hundred forty-six (93.2 per cent) hadn't sleeping disturbance during work problems. (Table 2)

Regarding work environment most of the respondents mentioned their work department were emergency 44 (16.7 per cent). Two hundred thirsty-seven (89.8 per cent) of the respondents mentioned that infection prevention committee exists in their facility. One hundred sixty-seven (63.3 per cent) of the respondents hadn't taken a training on infection prevention. Most of the respondents 254 (96.2 per cent) reported that safety boxes always available on their workplace. One hundred forty-one (53.4 per cent) of the respondents reported that safety boxes turn out whenever overfilled or more than 3⁄4. Two hundred twenty (83.3 per cent) of the respondents reported that safety guidelines available in their working environment. Majority of the respondents 247 (93.6 per cent) had protocol to report the injury on their department and most of respondents 241 (91.3 per cent) were reported injuries to concern body. Most of the respondents 157 (59.5 per cent) claimed working more 40 hours per week. (Table 3)

Professional distribution of needle sticks injuries among health professionals, 73 (68.3 per cent) were nurses, midwives 19 (17.7 per cent), and Laboratory technicians 15 (14 per cent).

Two hundred forty-eighty (94 per cent) of the respondent's concern about the risk of needle stick injury. Majority of the respondents 189(71.6 per cent) were perceived that the

rate of risk of needle stick injury as high risk and 257 (97.3 per cent) reported that needle stick injury was avoidable. One hundred seven (40.5 per cent) of the respondent's experience needle stick injury in their entire job. Among those, 105 (98.1 per cent) of the respondent's experience needle stick injury within the last 12 months. Ninety (84.1 per cent) of respondents got injury by needle material. Regarding working shift the respondents experienced the injury forty-five (17.0 per cent) experienced in Day followed by in both shift which accounts thirty-three (12.5 per cent). Ninety (34.1 per cent) of respondents received medical care after the injury (Table 4). Seventy one (66.3 per cent) of the respondents claimed the reason to the occurrence of needle stick injury were lack of concentration, sudden movement of patient 47 (44 per cent), during blood collection Ninety 40 (37 per cent), during medication 33 (31 per cent), needle recapping 31 (29 per cent), opening needle 25 (23 per cent) and during disposal and working area 4 (3.7 per cent).

Bivariate logistic regression analysis showed that female, (COR=2.436 (95 per cent Cl 1.112-5.337)), unmarried, (COR=3.018 (95 per cent Cl 1.304-6.982)), nurse, (COR=2.778 (95 per cent Cl 0.481-16.034)), chewing khat, (COR=8.432 (0.999-71.171)) and safety box turn out, (COR=2.855 (1.293-6.307)) were identified as predictors of NSI. In multivariable logistic regression analysis, after other variables were controlled, Sex, Marital status and safety box turn out found to be significantly associated with the NSI. Being male was 4.11 times more likely to experience needle stick injury than female health professionals (AOR=4.11 (95 per cent Cl, 1.469, 11.522)), unmarried respondents were 4.9 times more likely to experience needle stick injury than married respondents (AOR=4.91 (95 per cent Cl, 1.69, 14.27)). Overfilled safety box turns out users were 2.9 times more likely to experience needle stick injury than non-users (AOR=2.9 95 per cent Cl, 1.54, 7.31)). (Table 5)

Discussion

In this study high level of needle stick injury among health professionals was detected. Life time exposure of needle stick injury among health professionals was found to be 40.5 per cent. This finding is higher than a study done in Jigjiga Zone (31 per cent) and Hawassa (35.8 per cent). This high prevalence of needle stick injury could be attributed to the risky habit of the health professionals like separating or disassembling used needles prior to disposal and also due to the difference in the study health facility setups and implementation of universal precautions. However, this result is much lower when compared with study done in Jordan (67.6 per cent), South Korea (74.4 per cent), Iran imam Reza hospital (73.3 per cent) and Iran imam Hussein hospital (63.3 per cent), Bahir Dar, (66.6 per cent), Pakistan (67 per cent), Nepal (74 per cent)[7,11-15]. This difference might be related to the fact that the above studies were conducted by mixing all types of health professionals from hospitals, socio-demographic and behavioural characteristics of the participants. In this study the prevalence of needle stick injury occurred for the last 12 months was 98.1 per cent. This result was higher than studies from Turkey (44.3 per cent) and Dessie referral hospital (43 per cent)[13,16-19]. In Germany (31.4 per cent), India (37.5 per cent), Dessie town (34.5 per cent), East Gojjam (22.2 per cent), North West Ethiopia (18.7 per cent), Bale (19.1 per cent) and Tigray (25.9 per cent)[20-22]. The difference could be the possible reasons for the variability between the prevalence estimate in the current study and the pooled prevalence estimate from elsewhere and may be related to the variation of health care settings.

The possible activities for the occurrences of needle stick injury among health professionals were lack of concentration (66.3 per cent), sudden movement of the patient (44 per cent) and needle recapping (29 per cent) while (95.5 per cent) of the respondents use personal protective equipment. This finding higher than studies done in Jigjiga and Haramya, the occurrences was sudden movement of patients (22.1 per cent) and needle recapping (9.5 per cent) and in Malaysia, (27.2 per cent) of NSIs causes were recapping of syringes after use. During blood collection were (37 per cent), when giving medication (31 per cent) and during opening needle. This is inconsistent with previous studies in developing countries. Regarding the frequency of injury, (54.2 per cent) had experienced needle stick injuries at least once. This is inconsistency with studies done in India (33.3 per cent), and western Ethiopia (12.8 per cent) encountered 2–4 times within the past 12 months, (3.4 per cent) encountered >4 times within the past 12 months and (1.7 per cent) do not recall how often they encountered the injury[23-25]. The difference might be related to the fact that current study was conducted by mixing all types of health professionals from hospitals.

In the present finding, the working environment was emergency (16.7 per cent) & surgery & orthopaedic ward (16.7 per cent), medical ward (15.9 per cent) and paediatric ward (14 per cent). This is in line with studies done in Taiwan, Haramaya and Jigjiga University where largest number of needle stick injuries occurred in outpatient departments (50 per cent) and emergency and one or more needle stick/sharp injury in the past one year most of the incident occurred in emergency and medical ward. This could be because of the fact that especially at emergency departments the nursing cares provided are lifesaving and crisis management[24,26]. The job category of participants (68.3 per cent) was nurse. Similarly, several studies have

shown that different healthcare workers have had various rates of NSIs among which the proportion of nurses has been higher than others. The rates of NSIs in Egypt, Pakistan, Turkey, and Australia were (66.2 per cent), (45 per cent), (45 per cent), and (51 per cent), respectively. In addition, the results of studies conducted in different provinces of Iran showed that the rates of NSIs in the hospitals of Mazandaran & Shiraz were (57.3 per cent), & (38 per cent) respectively[27,28].

According to a study conducted on nurses in Iran, this rate was (45.9 per cent). However, the present study showed that (89.8 per cent) reported that infection prevention committee exists in their facility and 166 (63 per cent) of respondents mentioned that the IPC supervise weekly, (63.3 per cent) of the respondents hadn't taken training on infection prevention and (53.4 per cent) of the respondents reported that safety boxes turn out when overfilled or more than 3⁄4, while, (46.6 per cent) reported that turn out 3/4. This finding implies that there is a need to give more emphasis on infection prevention guidelines in health care settings. This finding shows that having infection prevention guidelines in every department and utilizing it can minimize the risk of needle stick and sharp injuries among the nurses and other health care workers. The Occupation Safety and Health Administration (OSHA) blood-borne pathogen standard, in order to increase awareness among health care workers of the dangers of needle stick injuries and other types of disease transmission, the Centers for Disease Control (CDC) and the Occupational Safety and Health Administration (OSHA) in the United States introduced the "Universal Precaution Guidelines," which have become the worldwide standard in both hospital and community care settings. In the present survey (83.3 per cent) of the respondent reported that safety guidelines available in their working environment and (93.6 per cent) reported that they have protocol to report the injury on their department and (91.3 per cent) were reported injuries to concern body. Similarly, a cross sectional study that was conducted in Serdang Hospital Malaysia showed that (99.1 per cent) of the respondents agreed that needle stick and sharps injury need to be reported, However, out of those health care workers (23.5 per cent) who had needle stick injury only (30.9 per cent) had reported the incident[29]. This is an indication for the existing gaps between knowledge and practice among the health care workers regarding injury reporting. Nearly, (59.5 per cent) of respondents claimed that working more 40 hours per week. This implies work load makes health professionals to be stressed, loss their ability to concentrate and fatigue, which are more likely to increase the chance of human error and contribute to a tendency towards risky behaviours and poor compliance with the precautions in general. The problem of under-staffing in developing countries hence, it has implications for policy makers and hospital administrators to ensure that working hours do not exceed than those prescribed in legislation.

In the present study Sex, marital status and safety box turn out found to be significantly associated with needle stick among health professionals. Being male was significantly associated with NSSI; being male was 4.11 times more likely to experience needle stick injury than female health professionals (AOR=4.11 (95 per cent CI, 1.469, 11.522). This is consistent with the report from Southwest Ethiopia[30,31]. The possible explanations might be because men are less likely to use universal precautions. Unmarried respondents were 4.9 times more likely to experience needle stick injury than married respondents (AOR=4.91 (95 per cent CI, 1.69, 14.27). This might be married people feel more responsible and practice safety guidelines. Overfilled safety box turns out user were 2.9 times more likely to experience needle stick injury than non- user (AOR=2.9 (95 per cent CI, 1.54, 7.31). this shows the need of monitoring the adherence of safety guidelines in health care setting is still needed. This study is limited for the following reasons. There might have been recall bias which is likely to occur because the subjects were interviewed about events that had occurred a year ago. The cross-sectional nature of the study does not allow making assumptions surrounding causal effects between the relationships.

Conclusion

The study found prevalence of needle sticks injury among health professionals in the two selected public hospital was 40.5 per cent. Sex, marital status and safety box turn out were independent predictors of needle stick injuries among health professionals. The health administrations should arrange training for healthcare providers to fill gaps through constant healthcare equipment supplies, supervision, and evaluation to increased occupational safety for health professionals and improve the working condition for healthcare workers and increase their adherence to universal precautions.

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PEER REVIEW

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

ETHICS COMMITTEE APPROVAL

College of Medicine and Health Science research ethics committee REC/023/2013.

Tables

Table 1: Socio-demographic characteristics among health professionals in Degahbur and Kebridahar public hospitals.

Characteristics		N	%
Age	25-34	166	62.8
	35-44	98	37.2
Sex	Male	135	51.2
	Female	129	48.8
Marital status	Single	178	67.4
	Married	85	32.2
	Divorced	1	0.4
Ethnicity	Somali	255	96.6
	Amhara	5	1.9
	Tigre	4	1.5
Religion	Muslim	255	96.6
	Orthodox	9	3.4
Education	Diploma	99	37.5
	Degree & above	165	62.5
Profession	Nurse	176	66.7
	Midwife	41	15.5
	Laboratory	47	17.8
Experience	1-4 years	194	73.5
	5-9years	70	26.5
Income salary	3000-4499	99	37.5
	4500-5999	143	54.1
	6000-7499	3	1.2
	≥7500	19	7.2

Table2: Behavioural characteristics among health professionals in Degahbur and Kebridahar public hospitals.

Characteristics		N	%
PPE use	Yes	252	95.5
	No	12	4.5
Needle recap	Never	225	85.2
	Sometimes	35	13.3
	Mostly	3	1.1
	All the time	1	0.4
Ever chew khat	Yes	23	8.7

	No	241	91.3
Smoking	Yes	8	3
	No	258	97
Sleeping disturbance	Yes	18	6.8
	No	246	93.2

Table 3: Working environment among health professionals in Degahbur and Kebridahar public hospitals.

Characteristics		**N**	**%**
Working department	Emergency	44	16.7
	Surgery & Orthopedic	44	16.7
	Medical ward	42	15.9
	Laboratory	24	9.1
	Operation room/ICU	23	8.7
	Pediatric	37	13.6
	Gyne & Obs ward/MCH	31	11.7
	Others	6	2.3
IP training	Yes	97	36.7
	No	167	63.3
Infection prevention committee	Yes	237	89.8
	No	27	10.2
IPC supervision	Not at all	18	6.8
	Weekly	166	63
	Monthly	68	26
	Quarterly	9	3.4
	Yearly	3	1.1
Safety box availability	Always	254	96.2
	Sometimes	10	3.8
Safety box turn out	Overfilled/more than 3/4	141	53.4
	Turn out when ¾	123	46.6
Safety guidelines exist	Yes	220	83.3
	No	44	16.7
Injury report protocol	Yes	247	93.6
	No	17	6.4
Report to concerned body	Yes	241	91.3
	No	23	8.7
Working hours per week	40 hours	107	40.5
	More than 40 hours	157	59.5

Table 4: Prevalence and perception among health professionals in Degahbur and Kebridahar public hospitals.

Characteristics		**N**	**%**
Concern the risk of NSIs	Yes	248	94
	No	16	6
Risk of NSIs	Not risk	10	3.8
	Low risk	12	4.5
	Moderate	53	20.1
	High	189	71.6
Exposure NSI in entire job	Yes	107	40.5
	No	157	59.5
Often had NSI (N=107)	Once	59	54

	More than Once	48	46
NSI in the last 12 months (N=107)	Yes	105	98.1
	No	2	1.9
Injury materials (N=107)	Needle	90	84.1
	Blade/lancet	4	3.7
	Others	13	12.2
Injuried working shift (N=107)	Night	27	25.2
	Day	45	42
	Both	35	32.8
NSIs transmit diseases	Yes	259	98.1
	No	5	1.9
Received medical care after NSIs (N=107)	Yes	90	84.1
	No	17	15.9

Table 5: Predictors of needle stick injury among health professionals in Degahbur and Kebridahar public hospitals.

Variables		**NSI**		**COR (95% CI)**	**AOR (95% CI)**
		Yes	**No**		
Sex	Male	31	21	2.43 (1.11-5.33)**	4.114 (1.47-11.52)**
	Female	20	33	1	1
Marital status	Unmarried	39	28	3 (1.3-6.98)**	4.91 (1.69-14.27)**
	Married	12	26	1	1
Profession	Nurse	33	40	3.33 (0.97-11.44)**	3.737 (0.824-16.94)
	Midwife	7	10	3.92 (0.88-17.56)	3.854 (0.65-22.91)
	Laboratory	11	4	1	1
Safety box	Overfilled	31	19	2.85 (1.29-6.30)**	2.906 (1.154-7.318)**
	Turn-out ¾	20	35	1	1
Chewing khat	Yes	7	1	8.432 (0.999-71.17)**	5.536 (0.475-64.57)
	No	44	53	1	1
**=P-value less than 0.05					