Lancet versus needle phobia among undergraduate medical students: A psychological perspective

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Abstract

Background: In medical curriculum, experiments in haematology laboratory, require blood with invasive procedures which induces pain. We have observed that majority of the undergraduate students suffer from belonephobia and pain while pricking their own finger. Very few studies are available for finger pricking pain among students. So, this study was conducted to compare any difference in pain and symptoms felt by students after pricking with hypodermic needles and lancet during routine haematology experiments among undergraduate students

Material and methods: After obtaining ethical clearance, this study was conducted in the department of Physiology, Subharti Medical College, Meerut. A total of 216 students (120 females and 96 males) participated voluntarily. They were explained the procedure of how to prick their finger thoroughly. On the first week they pricked with a needle and then on next turn they pricked with a lancet. On both the turns they had to fill a questionnaire based on their experience of fingerpricking. Data from both the questionnaires was filled and was analysed in the SPSS software version 19. Chi square test was applied.

Results: In our study, we found that fear of pain and number of symptoms were significantly lower after pricking with lancet compared to hypodermic needle in all subjects ($P<0.001$).

Conclusion: It may be due to less pain sensation when compared to hypodermic needles. Less penetration depth with lancets causes minimal injury to the tissue and therefore reduced lancing pain.

Keywords: lancet, needle phobia, medical students, finger pricking pain, Blood-injury injection phobia

Introduction

Capillary blood sample is commonly obtained by finger pricking either with hypodermic needle or lancet[1]. Needles are the most widely used medical device, with an estimated administration of 16 billion injections worldwide[2]. To enable the delivery of drugs, vaccines and other substances into the body or for extraction of fluids and tissues, needles are available in a wide range of length and gauges (i.e; diameters)[3]. Needles are widely unpopular among children and adults alike due to the pain, anxiety, phobia and difficulty of use[4,5.] Needle phobia (belonephobia) is a subtype of blood injury injection phobia (BII phobia). A needle phobic experiences cognitive symptoms like negative and anxious thoughts about needles and other pointed objects which create a constant state of alertness and thus further reinforces the fear and anxiety. A belonephobe always avoid using sharp objects or even go near them[6].

Studies have reported that relative fear of lancets affected comparatively less population . It may be due to less pain sensation when compared to hypodermic needles. Less penetration depth with lancets causes minimal injury to the tissue and therefore reduced lancing pain[7,8].

In medical curriculum, experiments in haematology laboratory , require blood with invasive procedures which induces pain. We have observed that majority of the undergraduate students suffer from belonephobia and pain while pricking their own finger. They either get it pricked by someone else or squeeze the blood due to improper pricking. If the blood is obtained by squeezing the fingers then it gets diluted by the tissue fluids, thereby giving low values and the results are erroneous and unreliable[9].

Very few studies are available for finger pricking pain among students[10],[11]. So, this study was conducted to compare any difference in pain and symptoms felt by students after pricking with hypodermic needles and lancet during routine haematology experiments among undergraduate students

Material and methods

The study was conducted in the Haematology laboratory of Physiology department in Subharti Medical College Meerut, after obtaining ethical clearance from the Institutional Ethical Committee. Those who volunteer for the study were included. Informed written consent was taken from each participant. It was a study of longitudinal design and study period was from October 2016 to October2017. Study population included newly admitted First year under graduate medical students posted in haematology laboratory of Physiology department. A total of 216 subjects were taken , out of which 120 were females and 96 were males. Samples was selected by purposive sampling technique[12].

Inclusion Criteria:

Both Males and females (irrespective of their menstrual cycle phase) in the age group of 18-23 years, with normal BMI (18.5- 22.5 Kg/m2) and who were apparently healthy.

Exclusion Criteria:

Those who had dropped out of the study, received injections frequently, did regular blood testing, hyper sensitive to needle prick , having scar, callus or burn injury on the ring finger, recreational drug users, had disease (like, skin disease, liver disease, generalized anxiety disorder, depression and any other major psychiatric disorder, autonomic neuropathy, bleeding disorders , diabetes, sickle cell anaemia and thalassemia) or were not vaccinated for hepatitis B were excluded.

Methodology

Questionnaire:

The purpose of the study was explained to the subject. Printed copies of questionnaires, based on phobias and pain associated with finger pricking were distributed to the participants. Each subject was asked to fill out a semi- structured questionnaire regarding fear of injections after the experiment. Demographic characteristics were inquired and each study subject was asked in native language a combination of 8 close-ended type questions, regarding their fear of needles, by single volunteer. Questionnaire was adapted from a study and few questions were added, that explored study subject's behavior towards needles, type of fear , factors like smell in the room, seeing other students pricking and fear of teacher talking about finger prick was also explored[10.]

Assessment of pain was done by rating pain in numerical pain rating scale[13] Students had to indicate the intensity of pain level on a scaleof 0 (no pain) to 10 (worst pain imaginable).

A demonstration was done for the entire procedure. Standard pricking method on ring finger by 23 or 24 gauge needles was followed. Distal digit of ring(3rd) finger of non-dominant

hand on its palmar surface, about 3 to 5 mm lateral to nail bed was used for pricking purpose. After cleaning the finger with sprit swab, and letting it dry, the participants were instructed to prick their own finger by a single stabbing action just deep enough (about 2-3 mm) to give free flowing blood. They wiped away the first drop and collected the sample when blood was flowing spontaneously[9.]Then, on next week comparison was done by using lancets technique. The participants were also asked to fill the same questionnaire again after pricking by a lancet.

Statistical Analyses:-

Statistical analysis was done using statistical package for the social sciences (SPSS) windows version 19 and Microsoft excel. X^2 test was applied. Values were considered significant for a $P< 0.05$ with a confidence interval of 95%.

Table 1: Frequency distribution of variables among the students on exposure to needle and lancet

Variables	Needle exposure		Lancet exposure		P value
	N=216	%	N=216	%	
1. Taken any meal At least 2 hours before	139	64.36	132	61.11	0.43
2. Fear of pain during fingerprick	129	59.72	64	29.62	0.000***
3. Smell in the hematology room is a fear factor	11	5.07	1	0.46	0.003***
4. Hearing the teacher or lab assistant discuss about fingerpricking causes fear	69	31.94	13	6.01	0.000***
5. watching other students prick causes fear	50	23.14	21	9.72	0.0001***
6. Watching blood oozing out from the fingertip makes you panicky	28	12.96	14	6.48	0.022*

Table 2: Frequency distribution of symptoms during exposure to needle and lancet in both genders

Symptom	Needle exposure				Lancet exposure			
	Female (n=120)		Male (n=96)		Female (n=120)		Male (n=96)	
	n	%	n	%	n	%	n	%
Present	45	37.5	30	31	19	16	12	12.5
Absent	75	62.5	66	69	101	84	84	87.5
Total	120	100	96	100	0	100	96	100

Table 3: Association of symptoms between 2 groups and within the same group during Needle (N) and Lancet (L) exposure.

Association between	X^2 value	P value
Male vs Female (N)	0.919	0.338
Male vs Female (L)	0.482	0.488
Female (N) vs (L)	14.40	0.001***
Male (N) vs (L)	9.87	0.002 **

Chi-square test (X2)

Table 4: NPRS during needle and lancet exposure in both genders

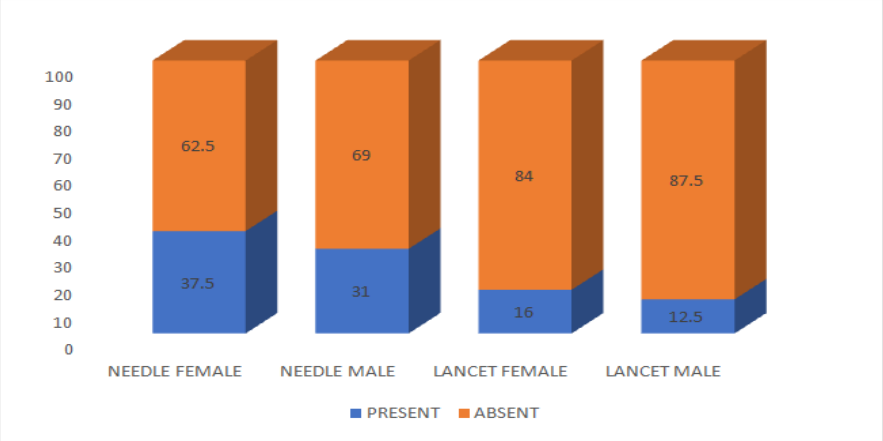
Grading	Needle exposure				Lancet exposure			
	Female		Male		Female		Male	
	n=120	%	n=96	%	n=120	%	n=96	%
Mild (0-3)	34	28.33	50	52.1	75	62.5	74	77.1
Moderate (4-6)	62	51.66	39	40.8	43	35.83	22	22.9
Severe (7-10)	24	20	7	7.1	2	1.66	0	0
Total	120	100	96	100	120	100	96	100

NPRS(numerical pain rating scale)

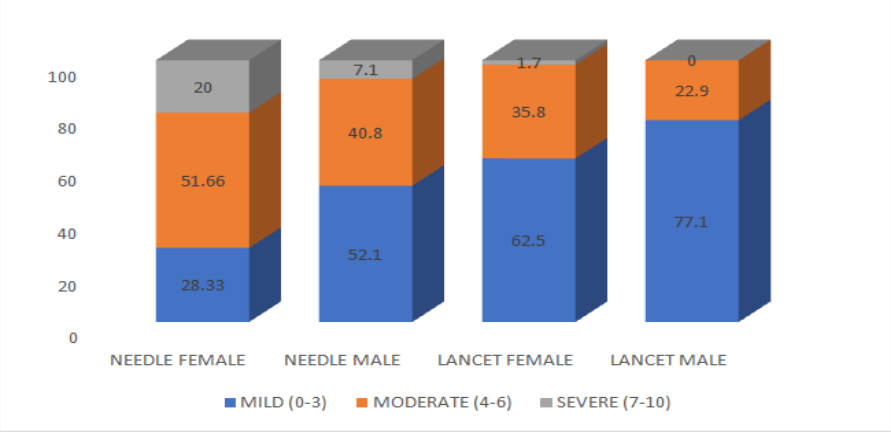
Table 5: Association of pain grading by NPRS between 2 groups and within the same group during exposure of needle (N)and lancet (L).

Association between	X^2value	P value
Male vs Female (N)	15.127921	0.0005***
Male vs Female (L)	6.201	0.045 *
Female (N) vs (L)	37.475498	0.0000***
Male (N) vs (L)	16.382866	0.0002***

Chi-square test (X2), NPRS(numerical pain rating scale)



Graph 1: graph to show the distribution of symptoms in males and females on exposure to needle and lancet.



Graph 2: graph depicting NPRS score in males and females on exposure to needle and lancet

Results

Table 1 denotes that there was less fear of pain during finger prick among students when they pricked their finger with lancet compared to needle(P<0.000). A significant association was also found for fear of smell in the haematology room, fear of teacher for lab assistant discussing about fingerpricking, fear while watching other students prick and panic when the blood oozes out from the finger tip; all these variables were less with the lancet exposure compared to needle exposure. Table 2 depicts that symptoms after exposure to needle like sweating, palpitations, dizziness, fainting are present in 37.5% of females and 31% of males on exposure with needle. Whereas, on exposure with lancet these symptoms are present only in 16% of females and 12.5% of males. Table 3 depicts that when the exposure with needle and lancet is compared for symptoms amongst females it is significant and also among males it is significant. So this means that there is a reduction in the symptoms experienced in both males and females when they prick their finger with lancet. In table 4, NPRS in both groups during Needle and lancet exposures is shown after categorizing into mild, moderate and severe grades of pain. Mild grade (0-3) was present in 28.3% females with needle exposure which rose to 62.5% with Lancet. Whereas, in males mild grade was present in 52.1% with needle and 77.1% with lancet. Moderate grade (4-6) was present in 51.66% in females iwith needle which declined to 35.8% with lancet. whereas, in males moderate grade was present in 40.8% with needle which declined to 22.9% with Lancet exposure. Severe grade (7-10) was reported by 20% with needle and 1.66% with Lancet by females. While in males severe grade was reported by 7.3% with needle exposure and 0% with lancet exposure. Table 5 shows significant difference during Needle exposure between males and females, during lancet exposure (L) between males and females, among females between N &L and among males between N & L

Discussion

The present study was conducted to compare any difference in pain and symptoms felt by undergraduate medical students after pricking with hypodermic needles and lancet during routine haematology experiments.

In our study, we found that fear of pain and number of symptoms was significantly lower after pricking with lancet compared to hypodermic needle in all subjects. Also, they reported an increase in mild grade of pain score and reduced moderate and severe grade after pricking with lancet compared to hypodermic needle. However, when females were compared with males after exposure with lancet, females reported more pain grading by NPRS than males (P<0.05). Both males and females experienced significantly less symptoms and pain after finger-pricking with lancet compared to needle (P<0.001).

A study reported that there is a linear relationship between lancet protrusion and penetration depth[14.]

Vasovagal reactions are predicted more strongly by psychological factors such as blood and injury fears and pain sensitivity than do demographic characteristics like younger age, gender[15.] The fear of fainting has been implicated as a psychological factor that may contribute to needle fear. Various psychological and biological factors interact to produce fear of injections as stated by various emerging theoretical models[16].

We may say that small needle size of lancet and quick penetration of lancet into skin might have created a psychological advantage which resulted in less anxiety and vasovagal reactions than those which occurred after pricking with hypodermic needle. Lancing pain is reduced because of less penetration depth with lancets which causes minimal injury to the tissue[7,8].

A study compared lancet with hypodermic needle for skin prick testing and found a significant difference for both needle and lancet comparing experienced versus inexperienced investigator's reproducibility[17].

A study in human volunteers found that 150-µm-long microneedles were reported as painless[18]. More recent results from their laboratory examined the effect of microneedle geometry on pain in greater detail and concluded that microneedle length and the number of microneedles are the most important geometric parameters affecting pain and that 500- to 750-µm-long needles can cause 10 to 20 times less pain than a 26-gauge hypodermic needle[3]. The lancet used in our study was 1.5mm long.

In a study it was concluded that heel prick with a lancet causes less crying than a 26-gauge needle[19].

Not only the actual wound size but also psychological factors influence pain perception. Anticipating pain is perceived as actual pain[20].

Heredity & Needle Phobia

As suggested by a research, memories can be passed down to later generations through genetic switches which allows offspring to inherit the experience of their ancestors. According to that, it is possible for some information to be inherited biologically through chemical changes that occur in DNA[21].

Fainting may be an adapted mechanism from early ancestry and prevent a cardiovascular shock[22,23.] It puts an individual in a horizontal position due to fall. In horizontal position, a low pressure blood can reach up to brain. This way it prevents blood loss and the symptoms like stroke. However, this hypothesis doesn't explain many things like why fainting that is triggered by injection or trivial skin injury occurs which does not involve the loss of blood[24]. Some have argued that fainting is not experienced until there is a 30% reduction in blood volume[25]. The fainting could possibly be also due to the disruption of synapse in the brain which could lead the individual unconscious.

Conclusion

It was concluded that Pricking with lancet provides a psychological advantage and there is a reduction in pain and symptoms when compared with hypodermic needle. Positive approach should be adopted by teaching faculty to alleviate this fear and anxiety. Students can be advised to use lancet instead of hypodermic needle. Belonephobia can be successfully treated by systemic exposure and counselling. Cognitive behavioral therapy may also be helpful in this context as the therapy is implicated to retrain the brain not to engage neural pathways that lead to the creation of mental disturbance after exposure to needle[26]. Anti anxiety drugs in severe condition may be used with clinicians guidance.

Psychological distraction, a form of attentional deployment, diverts the attention away from an emotional stimulus and toward other content[27]. Research has shown that distraction may be a useful tool for clinicians who work with a variety of pain problems[28] and is effective in reducing experiences of unpleasantness in adults by enhancing the processing of emotions[29].

Other treatment for phobia include – ethyl chloride spray or other freezing agents, iontophoresis, jet injectors or other local anaeqsthetics[30,31].

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Conflict of interest

The authors declare that there is no conflict of interest.

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