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Awareness about ELISA technique among dental students

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ABSTRACT

The enzyme-linked immunosorbent assay (ELISA) can be used to recognize proteins, peptides, antibodies as well as hormones. Often known also as an enzyme immunoassay (EIA), ELISA is used as a diagnostic test in the field of biomedicine and science. This study was conducted to determine the understanding of the ELISA technique among dental students. This survey was performed for assessing the awareness about ELISA technique amongst the dental students. This study was a questionnaire oriented, cross-sectional type of survey comprising 100 dental college students in Chennai. A self-designed questionnaire with 10 questions eliciting the knowledge and awareness about applications of ELISA technique among dental college students. Questionnaires were circulated through an online website survey planet. The questions explored the awareness on ELISA technique diagnostic indications, Direct ELISA, Indirect ELISA, Sandwich ELISA, Competitive ELISA and mechanism of ELISA technique. After the responses were received from 100 participants, data were collected and analysed.67% of the respondents were aware of the ELISA technique .52% were aware of direct ELISA technique. 45%% were aware of the indirect ELISA technique. 42% were aware of the sandwich ELISA technique, 38% were aware of the competitive ELISA technique. 35% were aware of the mechanism of the ELISA technique. The awareness about the ELISA technique in diagnostic medical applications was less among dental students. Increased awareness and educational programs should be initiated to spread knowledge about the ELISA technique among all students and clinicians.

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INTRODUCTION

The enzyme-linked immunosorbent assay (ELISA) can be used to recognize proteins, peptides, antibodies as well as hormones. Often known also as an enzyme immunoassay (EIA), ELISA is used as a diagnostic test in the field of biomedicine and science. Antibodies are mainly used to identify specified compounds. Conversely, ELISAs were indeed useful for estimating antigen/antibody saturation. ELISA operates by linking antibody as well as antigen to the enzyme testing. The calculation incorporates the actual antibody with the potency of sample enzymes to effectively classify antigens by testing antibodies and antibodies to check antigens. The effect ability and precision of the assessment is improved by coating the plate mostly with specific antibodies (Engvall and Perlmann, 1972).

ELISA was developed as a replacement technique for radioimmunoassays throughout the mid-1970s. It

is a plate-based method proposed for the identification and assessment of protein substances, antibodies, peptides, antigens and hormones. The rudimentary enzyme-linked immunosorbent test (ELISA) or enzyme immunosorbent assay (EIA) is not exactly like the other available antibody-based methodologies in such a way that the surface of the polystyrene (96 or 384) multi-well plate successively produces a plausibility of explicit reactions prohibiting the misleading on the substrate (Lequin, 2005; Ricchiuti, 2010).

The involved ELISA reagents that are adsorbed from outside microplate allow the separation of reagents that have already been bolstered out of non-bound nonspecific reagents throughout the test. In an ELISA, the antigen or antibody is attached to a strong substrate, for even the most part, on even a lesser scale well plate but rather, from that juncture on, is linked up with a partner antigen/antibody. The partner antigen/antibody is linked with test substance atom such as an enzyme or, but at the other hand, could be separated by an auxiliary antibody which is thus connected by conjugation to the enzyme. Identification of test shall be carried out by determining the enzyme activity of conjugate, that is carried out by glowering with a suitable substrate for the enzyme resulting in the era of the quantifiable object.

In the most part, the ELISA technique produces a tinged final result that ingests at a particular frequency and can be related to the sum of the analyte alluded to in the example. The most intense fundamental part of this process is the extremely specific antibody-antigen partnership. This ability of the technique to wash off ambiguous unbound reagents makes the ELISA method a convincing and effective tool for measuring accurate data of analytes in every event that is present within a rough and unpurified sample (Wada *et al.*, 1982). This survey was conducted to determine the understanding of the ELISA technique among dental students.

MATERIALS AND METHODS

This study was a questionnaire oriented, cross-sectional type of survey comprising 100 dental college students in Chennai. A self-designed questionnaire with 10 questions eliciting the knowledge and awareness about applications of ELISA technique among dental college students. Questionnaires were circulated through an online website survey planet. The questions explored the awareness on ELISA technique diagnostic indications, Direct ELISA, Indirect ELISA, Sandwich ELISA, Competitive ELISA and mechanism of ELISA technique. After the responses were received from 100 participants, data were collected and analysed.

RESULTS AND DISCUSSION

67% of the respondents were aware of the ELISA technique (Figure 1). 52% were aware of direct ELISA technique (Figure 2). 45% were aware of the indirect ELISA technique (Figure 3). 42% were aware of the sandwich ELISA technique (Figure 4). 38% were aware of competitive ELISA technique (Figure 5). 35% were aware of the mechanism of the ELISA technique (Figure 6).

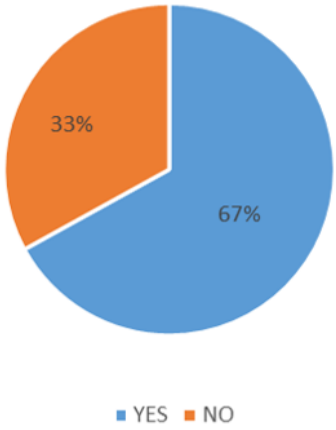

Figure 1: Awareness about ELISA technique

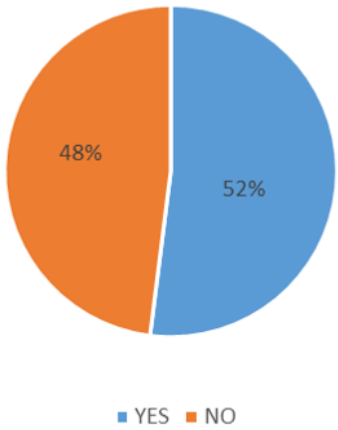

Figure 2: Awareness about direct ELISA technique

ELISA has also been modified in diagnostics as well as in quality control systems through international entities. These are fast and easy to complete, and in the view of the fact that they would be designed to quickly perform high throughput screening as well as multiplexing, they have managed to make a discovery from the far-reaching evaluation of various samples, just like diagnostic tests.

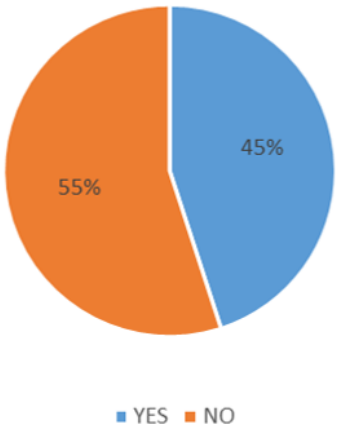

Figure 3: Awareness about indirect ELISA technique

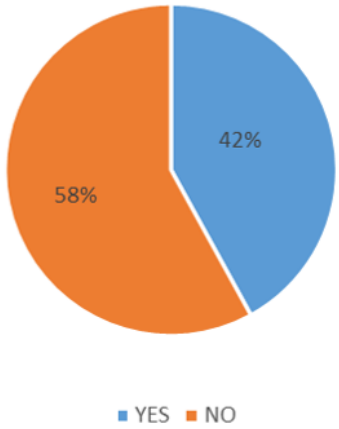

Figure 4: Awareness about sandwich ELISA technique

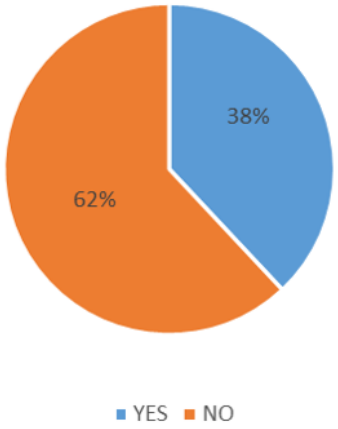

Figure 5: Awareness about competitive ELISA technique

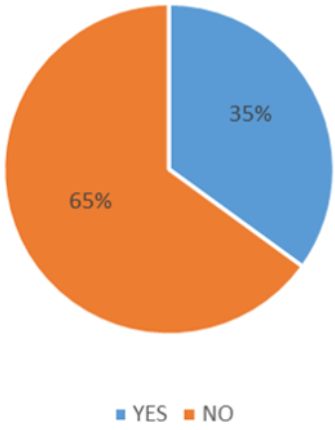

Figure 6: Awareness about the mechanism of the ELISA technique

ELISAs have retained their situation in wide use, in either their unique structure and in extended structures, with precise corrections, taking into consideration more than two analytes in each well, extremely sensitive records and simple yield (Rubenstein *et al.*, 1972).

Categories of ELISA

The basic ELISA test begins with the propagation of immobilizing antigen of the sample to wells of the multiwell panel. The immobilization technique can be performed by means of two methods that integrate direct adsorption to the outside of plate or by means of the antibody capture test adsorbed to plate. The antibody test should be particularly specific to the excitement antigen. Immobilization is caused by the expansion of recognition antibody, which results in such an antigen-antibody complex.

Antibody important for recognition is usually classified as manipulating enzymes such as alkaline phosphatase (AP) or horseradish peroxidase (HRP). ELISAs can be defined as having to be precise immediate, backhanded, sandwiched and severe in the following four major grades, depending on the changes made to the critical structures. Sandwich ELISA is perhaps the most outstanding entity in the ELISA analysis due to its high impact and power. Substrate assessment for the measure depends on its critical impact, the type of instrumentation needed and also its accessibility. (Leng *et al.*, 2008; Elshal and McCoy, 2006)

Direct ELISA

The exploration by virtue of a direct ELISA method is much faster as compared with other ELISA methods due to the limited progress achieved. This approach takes into account the inclusion of an antigen directly in microtiter plate wells, which is

accompanied by an expansion of enzyme identified with an appropriate antibody that recognizes an antigen which is correlative. The test is useful since an insignificant mistake is inclined due to the execution of a smaller number of steps involving only a batch of reagents. In this process, there is no necessary cross-responsive auxiliary antibody.

Sandwich ELISA

Sandwich ELISAs uses antibody combinations such as capture antibody and recognition antibody that can be a monoclonal or polyclonal antibody. Any antibody is extremely clear against the epitope of the antigen and is seen as increasingly sufficient for antigens with two epitopes. The explicitness of the organized antibody sets is crucial to affirm that they are authoritative to specific epitopes in obtaining accurate tests. As its title indicates, the capture antibody interacts with the antigen that could then be identified in both immediate and backhanded ELISA procedures because antigen calculation happens between the upper and lower layers of antibodies, that this whole technique is called the sandwich ELISA.

Indirect ELISA

The indirect ELISA method shows higher efficacy as it uses an antigen called an auxiliary antibody that is paired with an appropriate antibody. The process is known to be cheaper versus direct ELISA due to the need for fewer identified antibodies. The higher versatility of ELISA circuitous antibodies is remarkable as it allows enzyme-marked auxiliary antibodies to bind to specific important antibodies. The available antibody is, in the most being, polyclonal in origin with species reactivity enemies. But the containment to think about in this technique is the cross-reactivity of either an auxiliary antibody with quite a bound antigen that could cause a further concussion.

Competition/Inhibition ELISA

The ELISA competition/inhibition that is, in either case, referred to as ELISA blocking is understood to be a plate/surface dependent assay. This is one of the most mind-boggling tests done in all the rest of the ELISA procedures. In any case, it should be remembered that other ELISA forms can also be modified to fit into a severe arrangement. The operating system of this technique transcends and tests the fixation of an antigen or antibody in a given case, based on the presumed sign yield of the resulting obstruction. Essentially, it indicates a significant association of the test antigen or antibody to a designated antibody or antigen that is distinct in restricted fixation. (Dasso *et al.*, 2002; Dossus *et al.*, 2009; Taylor *et al.*, 1983)

ELISAs are known to be directly accessible to the most susceptible immuno assay levels. The trademark position for ELISA is between 0.1 and 1 femtomole or 0.01 nanogram and 0.1 nanograms, of which the effectability depends on the specific physiognomies of the antibody-antigen relationship associated with the test. In addition, a portion of usable substrates that generate an enhanced luminescent or fluorescent sign can be used to increase the potential to impact (Papoian *et al.*, 1991; Soman *et al.*, 2011)

CONCLUSION

The awareness about the ELISA technique in diagnostic medical applications was less among dental students. Increased awareness and educational programs should be initiated to spread knowledge about the ELISA technique among all students and clinicians.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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