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A Questionnaire based Assessment of Postgraduate's and Clinician's View on Pharmacogenomics in a Tertiary Care Centre

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Abstract: ***Aim of the study: Aim of this study is to assess the knowledge, attitude and practice of pharmacogenomics among postgraduates and clinicians. Materials and method: Based on a cross-sectional descriptive questionnaire on a five point scale. The questionnaire consists of three clusters which evaluate participant's awareness, perception, and practice of pharmacogenomics in clinical situation. Result: In the cluster which evaluated the awareness and practice the positive response of agree/strongly agree were 57.3% and 54.6% respectively. In the cluster which evaluates the participant's attitude the positive response were 91.8%. Comparing the positive response of clinicians and postgraduates, there is no much difference in attitude part. In awareness and practice part there is distinguishable difference between the two. Conclusion: In our study there is wide gap between attitude, knowledge and practice. Ample number of participants gave neutral response which makes creating awareness more significant. This study highlighted the felt need of pharmacogenomics in medical curriculum.***

Keywords: pharmacogenomics, pharmacogenetics, medical curriculum, KAP studies

1. Introduction

As William Osler said "no two faces are same so no two bodies are alike, and no two individuals react alike and behave alike. So drug response also varies. Pharmacogenomics is the study of genetic factors that underlie variations in drug response [1]. It is an exploring and exploding field in pharmacology which has an impact in every branch of pharmacology right from drug production, pharmacokinetics, pharmacodynamics, toxicology, pharmacoeconomics and ethical issues. So concomitantly it will enable healthcare professionals to predict who will respond to a drug, who will not, what dose to select, and who may have an adverse drug reaction to a drug, thereby to optimize the treatment for the patient. It started from the first example which takes us to the Pythagoras period; he described the red cell hemolysis in some Mediterranean populations who ate fava beans (favism), which we now know to be due to glucose-6-phosphate dehydrogenase deficiency, the most common enzyme deficiency in man. [2]. The completion of the Human Genome Project in 2003 [3] opened boundless possibilities in the field of pharmacology. The FDA added pharmacogenomics information to more than 200 drugs. [4]. which are used in day to day clinical practice. It also recommends interpretation of genetic/genomic biomarkers during new drug development.[5], so a drug can be eliminated early in the trial, thereby reducing the cost of drug production. It is no longer wisdom of few, but a widely accepted and practiced field globally. In our country the existence of a large and diverse population, with a high incidence of genetic diseases make it, an ideal set up for pharmacogenomics research and clinical usage. This diversity is a treasure because it defines the subgroups in a population that will be benefited more from a particular drug than others, and helps in detecting the side-effects that might not be seen in Caucasian population.On a similar note, another line of thought is that certain drugs that were withdrawn due to adverse reaction can be put to clinical usage safely in certain genomic population.[6]. With rapid growth of communication skills and information technology, coming years may see a drastic change in the practice of medicine and the practitioners have to be aware of recent advances and updates. So, it is relevant to assess the knowledge, perceived views and practice of pharmacogenomics among post graduates and clinicians in our tertiary care hospital.

2. Materials and Methods

This questionnaire is designed to assess the awareness of postgraduates and clinicians about pharmacogenomics, its implications in clinical practice and its significance in their curriculum.

Study design

Cross sectional descriptive questionnaire based study conducted at Govt.Rajaji Hospital; Madurai involving 100 (Postgraduates and Clinicians).This was started after obtaining prior permission from institutional authorities.

Study group

All Post graduates who had completed one year of course period and Clinicians who were willing to participate in the study from the field of Medicine and its super specialties,

were included assuming that they would have been exposed to sufficient clinical case load and prescription.

Methodology

The questionnaire was framed in English, and there were twenty questions. Survey questions were consistent across post graduates and clinicians. The questions are framed under three clusters of focus, and their responses were based on a five-point Likert scale. Strongly Agree, Agree, Neutral, Disagree and Strongly Disagree. The first cluster evaluated participants' awareness of pharmacogenomics. The second cluster evaluated participants' perception of pharmacogenomics; the third cluster evaluated participant's ability to imply it in clinical situation.

3. Result

The response of the awareness cluster of questions, (table 2) shows that 90% of the clinicians and 54% of the Post graduates agreed or strongly agreed that they are aware of its clinical implications . 84% of the clinicians and 8% of the Post graduates agreed or strongly agreed that they are aware of its about their labeling regulations. The fourth variable on table 1 in which the participant was asked about pharmacogenomics knowledge base website only one visited and the rest 99 were unaware of it. The neutral response is 29.6%. Table 3 shows the result of questions which evaluated the participant's perceived relevance about pharmacogenomics. Here 87% agreed or strongly agreed that it improves patient care and a notch higher 94% thought that it optimize the treatment and 92% of the participants agreed or strongly agreed that the idea of personalized medicine is good. 97 %agreed or strongly agreed that treating physicians should have a comprehensive knowledge about pharmacogenomics.90 % and 92% agreed or strongly agreed that it's relevant to current and future clinical practice. 98%strongly agreed or agreed that it will be nice if they have the pharmacogenomics profile of the patient, but on the question of its cost effectiveness only 32% agreed or strongly agreed it is cost effective, here most people who agreed are from psychiatry, and oncology and cardiology departments. 36% disagreed on that.79% agreed that it will have a wider reach if it has a insurance coverage.49% agreed/strongly agreed that it's only for drugs with severe adverse drug reaction and narrow therapeutic index.

Table 4 shows the result of final cluster which identifies participants comfortableness in implying genomics in practice. In our setup it is limited to identify patients and drugs which need genomic testing in their day to day patient care, and comfortableness in answering questions on pharmacogenomics. About their ability to identify patient who will be benefited by pharmacogenomics testing 80% of the clinicians agreed or strongly agreed that they can while compared with 26% of the post graduates, 72% of clinicians agreed/strongly agreed they are able to identify medicines which require pharmacogenomics testing compared with 32% of the post graduates. Only 34 % agreed /strongly agreed that they feel Comfortable on answering questions on pharmacogenomics.

Figure 1(a) shows us that 98% of the participants attitude is that it should be a important part of medical curriculum but on the other hand Figure 1(b) shows that only 2% strongly agreed or agreed that the current actual curriculum is sufficient .

4. Discussion

In the past ten to fifteen years this field in pharmacology expanding significantly with the human genomic project from a horizon to a smudge and in to a flourishing area of interest in therapeutics and theranostics. The success scenarios frequently quoted are the HercepTest®/trastuzumab for the Her2-positive subset of breast cancer patients. Another example is that of Imatinib a synthetic tyrosine kinase inhibitor, which is used in chronic myeloid leukemia is now, considered as the drug of choice for metastatic and inoperable gastro intestinal stromal tumors. so it's clearly breaking obstacles in improving patient care.

Bio banks having genomic information are well established in American and European nations, and started budding in neighboring countries like China. Our country is also grooming itself as a player with projects like ,The Indian Genome Variation (IGV) Consortium, HUGO (Human Genome Organization) and ICMR s' 'Indian pharmacogenomics chip'[7]. So as a benefiter of all this projects, the health care providers' knowledge in this field is essential. Pharmacogenomics in curriculum is followed in some premier medical institutions in India but not uniform all across Indian medical universities.

This study demonstrated that on the whole the participant's perceived relevance of pharmacogenomics is more positive than their awareness and practice. While comparing the clinicians and postgraduates by taking in to account their positive response in all three cluster, the first and the third cluster response concerned with awareness and practice as depicted in figure2(a) & 2(c) respectively showed us that there is distinguishable difference between the two groups. At the same time with respect to the second cluster i.e. concerned with attitude there is no much difference between the two groups as shown in figure 3(b). It implies that though the attitude is similar, awareness and clinical implications are better in clinicians than Postgraduates. In a hypothetical view we can say that much more awareness and clinical application getting shape once they are into practice and it also implies that there is definitely a need for its knowledge for clinical practice. 99% of the participants were unaware of pharmacogenomics website which gives us information about already established genomic variations behind therapeutic response.

The strongly agreed/agreed response was more than 80% for most of the attitude questions. 97% agreed that the physician should have a comprehensive knowledge of pharmacogenomics..

The major obstacle in genomic testing is cost effectiveness. 32% agreed that it is cost effective Vs. 34% who disagreed with that and 79% agreed that insurance coverage will increase its utility. Most of them who gave positive response

are from specialties like oncology, psychiatry, and cardiology. When compared with therapeutic drug monitoring the advantages of pharmacogenomics are 1.non invasiveness 2. Eliminating adverse effects. 3. Patient compliance is not necessary. 4. the results remain constant over the lifetime of an individual, 5. Provide predictive value for many drugs rather than a single drug on[8] flip side is its feasibility due to cost. Economics of pharmacogenomics is layered with complexities; it depends on comparing the genomic test cost with reduction in health care cost by reducing hospital stay, physicians visit, and improvement in compliance and quality of life of the patient. Micro arrays reduce the cost of pharmacogenomics to a considerable extent by identifying predetermined single nucleotide polymorphism. Example is. AmpliChip CYP450.(9). Shift from research to clinical environment in our set up needs further cost reducing technologies. The penultimate thing is the neutral response for awareness and practice part were 29.6% and 23.3% attitude was 10.5% .As this part reflects the ambiguous mind of the participant, which creates hollowness .We can fill it with education. The ultimate thing is that in our study 98% of the participant's attitude is that it should be a important part of medical curriculum but on the other hand only 2% strongly agreed or agreed that the current curriculum is sufficient

Some premier institutions like AIMS, JIPMER have mentioned about pharmacogenomics in their curriculum but it is not uniform across all Indian medical universities.

5. Conclusion

Pharmacogenomics is a flourishing area of interest in therapeutics and theranostics .This study demonstrated that the participant's perception regarding relevance of pharmacogenomics is more positive than their awareness and practice. So there is wide gap between attitude, knowledge and practice. Ample number of participants gave neutral response which makes creating awareness more significant. This study highlighted the felt need of pharmacogenomics in medical curriculum, which needs attention in our syllabus.

Table 1: Questionnaire and the response of participants for each category in percentage

Q.No	Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	Frequency of coming across terms pharmacogenomics and Pharmacogenetics is increasing in my field journals	14	40	42	4	0
2	I am well aware of the implications of pharmacogenomics in Therapeutic effectiveness	6	66	22	4	2
3	Aware of labeling regulation of pharmacogenomics in drug Packages	4	42	25	19	10
4	Visited the pharmacogenomics knowledge base website Pharmkb.org;cpic guidelines –1 yes 2 no		Yes-1	No-99		
5	Pharmacogenomics improve patient care	25	62	1	8	4
6	Pharmacogenomics optimize the treatment	48	46	6	0	0
7	Idea about personalized medicine is good	59	33	6	2	0
8	Physician should have a comprehensive knowledge of Pharmacogenomics	38	59	0	3	0
9	Pharmacogenomics is relevant to current clinical practice	5	85	8	2	0
10	Pharmacogenomics will be more relevant in future clinical Practice	46	47	7	0	0
11	You think the major hindrance in using pharmacogenomics is lack of Knowledge	12	33	23	17	15
12	Pharmacogenomics in current clinical practice is cost effective	15	17	34	24	10
13	While treating patient it will be nice if I have the Pharmacogenomics profile of the patient	64	34	2	0	0
14	I agree that pharmacogenomics testing is only for drugs with Narrow therapeutic range or for serious ADR	3	46	25	24	2
15	Pharmacogenomics testing will have a wider reach if it has an Insurance cover	35	44	17	4	0
16	Pharmacogenomics should be important part of Medical curriculum	62	29	9	0	0
17	In clinical situations I will be able to identify patient who will Be benefited by pharmacogenomics testing	22	41	14	19	4
18	I am able to identify medicine which require Pharmacogenomics testing	2	50	26	20	2
19	Comfortable on answering questions on pharmacogenomics	9	40	30	17	4
20	Pharmacogenomics in my curriculum is good	0	2	35	59	4

Table 2: Response of participants for awareness cluster in percentage

Q.No	*Question*	*Strongly Agree / Agree n(%)*	*Neutral n(%)*	*Strongly Disagree / Disagree n(%)*
1	Frequency of coming across terms pharmacogenomics, pharmacogenetics is increasing in my field journals	54 Clinician 41(82) PG 13 (26)	42 Clinician 9(18) PG 33 (22)	4 Clinician 0 PG 4 (8)
2	I am well aware of the implications of pharmacogenomics in therapeutic effectiveness	72 Clinician 45(90) PG 27(54)	22 Clinician 4(8) PG 18(36)	6 Clinician 2(4) PG 4(8)
3	Aware of labeling regulation of pharmacogenomics in drug packages	46 Clinician 42(84) PG 4(8)	25 Clinician 8(16) PG 17(34)	29 Clinician 0(0) PG 29(58)

Table 4: Response of participants for implication in clinical practice cluster

Q.No	*Questions*	*Strongly Agree/ Agree n(%)*	*Neutral n(%)*	*Strongly Disagree / Disagree n(%)*
17	In clinical situations I will be able to identify patient who will be benefited by pharmacogenomics testing	63 Clinician 40(80) PG23(46)	14 Clinician 10(20) PG4 (8)	23 Clinician7(14) PG 16(32)
18	I am able to identify medicine which require pharmacogenomics testing	52 Clinician 36(72) PG16(32)	26 Clinician 8 (16) PG18 (36)	22 Clinician6(12) PG 16(32)
19	Comfortable on answering questions on pharmacogenomics	49 Clinician 33(66) PG16(32)	30 Clinician 12(24) PG18 (36)	21 Clinician5(10) PG 16(32)

Table 3: Response of participants for attitude cluster

Q.No	*Questions*	*Strongly Agree / Agree n(%)*	*Neutral n(%)*	*Strongly disagree/ Disagree n(%)*
5	Pharmacogenomics improves patient care	87 Clinician 3(6) 45(90) PG 42 (84)	1 Clinician1 (1) PG 0	12 Clinician 4(8) PG 8(16)
6	Pharmacogenomics optimise the treatment	94 Clinician 50(100) PG44(88)	6 Clinician 0 PG 6 (12)	0
7	Idea about personalised medicine is good	91 Clinician48(96) PG43(86)	9 Clinician2(4) Pg 7(14)	0
8	Physician should have a comprehensive knowledge of pharmacogenomics	97 Clinician50(100) PG47(96)	3 Clinician 0 PG 3(6)	0
9	Pharmacogenomics is relevant to current clinical practice	90 Clinician49(98) PG41(82)	10 Clinician1(2) PG 9(18)	0
10	Pharmacogenomics will be more relevant in future clinical practice	91 Clinician48(96) PG43(86)	9 Clinician 2(4) PG 7(14)	0
12	pharmacogenomics in current clinical practice is cost effective	32 Clinician 17(34) PG15(30)	34 Clinician 18(36) PG 16(32)	34 Clinician 15(30) PG 19(38)
13	while treating patient it will be nice if I have the pharmacogenomics profile of the patient	(98) Clinician 50(100) PG48(96)	(2) Clinician 0 PG 2 (4)	0
14	I agree that pharmacogenomics testing is only for drugs with narrow therapeutic range or for serious ADR	49 Clinician 24(48) PG25(50)	25 Clinician 11 (22) PG14 (28)	26 Clinician15(30) PG11(22)
15	Pharmacogenomics testing will have a wider reach if it has an insurance cover	(79) Clinician43(86) PG36(72)	17 Clinician 7(14) PG10(20)	4 Clinician 0 PG4(8)

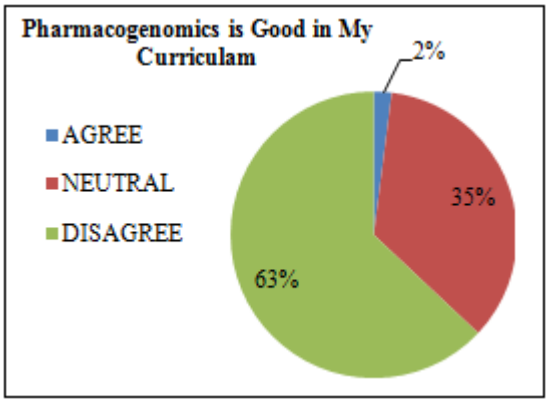

Figure 1 (a)

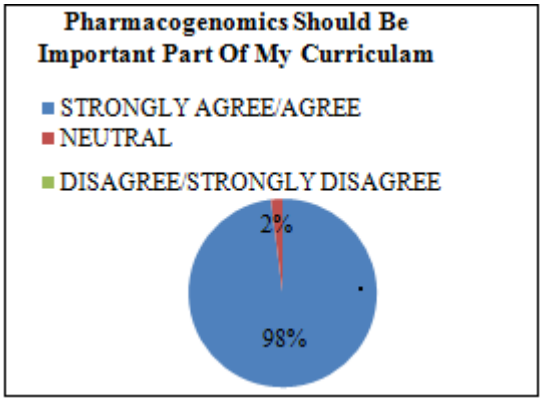

Figure 1 (b)

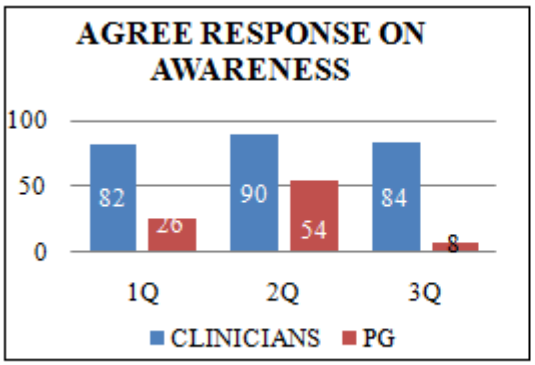

Figure 2 (a)

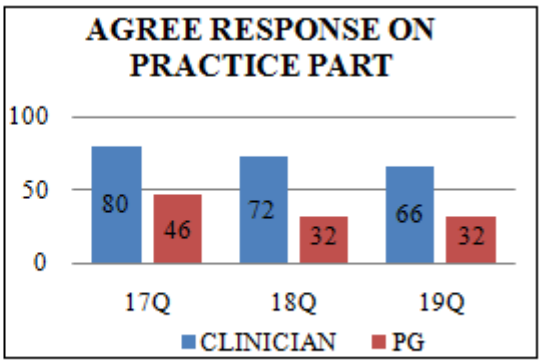

Figure 2 (c)

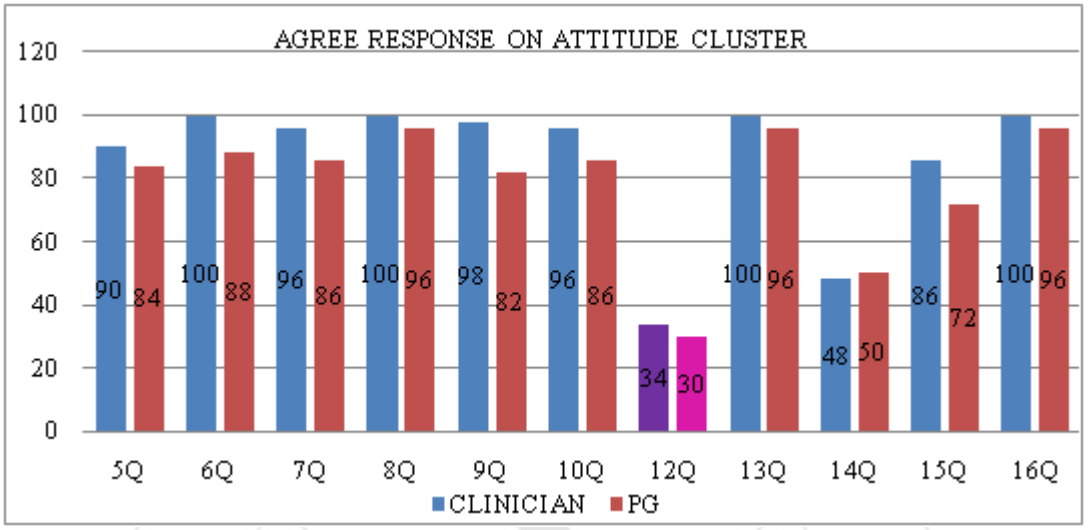

Figure 2(b)

Source of funding: None

Study limitation: small sample size, Implication of genomics in our set up is limited.

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