

## Knowledge, Attitude and Practice of Doctors and Medical Students towards Stem Cell Use in The Management of Diabetes Mellitus

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### ABSTRACT

**Objectives:** To assess the Knowledge, attitude, and practice of Doctors and Medical Students towards Stem Cell use in the Management of Diabetes Mellitus. **Methods:** This cross-sectional descriptive study was conducted to assess the knowledge, attitude and practice of stem cell therapy among 120 Doctors and medical students in Tabuk City, Saudi Arabia during the period from April to December 2017, participants signed a written informed consent, then responded to a self-reported twenty-six item questionnaire. (Ten questions to assess knowledge, 6 questions to assess practice, and 10 questions to assess attitude). The data were analyzed by The Statistical Package for Social Sciences (SPSS), and the independent-samples t-test was used to compare men and women, doctors and students. A P-value of <0.05 was considered significant.

**Results:** Out of 120 doctors (n=75) and medical students (n=45), the male dominance was evident (81.6%). The knowledge was poor in 21%, fair in 76.5%, good in 2.5%, while no one scored excellently. The attitude score was excellent in only 0.8%, good in 9.2%, fair in 73.1% and poor in 16.8%. Regarding practice, excellent, good, fair, and poor were reported in 14.3%, 52.9%, 21.8%, and 10.9% respectively. No significant statistical gender differences were evident between doctors, and medical students. **Conclusion:** The knowledge, attitude, and practice were suboptimal among doctors and medical students in Tabuk, Saudi Arabia. An educational intervention to upgrade the knowledge is highly needed.

**Keywords:** Knowledge, attitude, practice, doctors, medical students, KSA.

### INTRODUCTION

Diabetes Mellitus (DM) is one of the fastest-growing health problem in the world, which is now reaching to epidemic proportion in some countries. It is mainly due to consequence of life-style as lack of exercise, unhealthy diet, obesity and overweight. Over the past four decades major socio-economic changes have occurred in Saudi Arabia. The growth and prosperity have brought pronounced changes in the lifestyle of the people. Most notably, eating habits are less healthful and the level of physical activity has declined. There is increased consumption of fast foods and sugar-dense beverages (e.g., sodas). Simultaneously, technological advances – cars, elevators, escalators, remotes - have led to a decrease in level of activity. Traditional dependence on locally grown natural produce such as fruits, vegetables and wheat has also shifted. This has resulted in the dramatic increase in the diabetes prevalence<sup>[1]</sup>.

Diabetes Mellitus is an example of the rapidly growing diseases that may be treatable by stem-cell-derived tissues, diabetes mellitus affects >300 million people worldwide. Type 1 diabetes results from autoimmune destruction of  $\beta$  cells in the pancreatic islet, whereas the more common

type 2 diabetes results from peripheral tissue insulin resistance and  $\beta$  cell dysfunction<sup>[2]</sup>.

Strategies to restore regulated insulin production in diabetic patients include regeneration of endogenous pancreatic  $\beta$ -cells via neogenesis from a resident progenitor cell population, proliferation of pre-existing  $\beta$ -cells or trans-differentiation from a closely related non  $\beta$ -cell type. Alternatively, an exogenous source of insulin-secreting  $\beta$ -cells, such as cadaveric human islets, porcine islets or human embryonic stem cell (hESC)-derived cells could be transplanted into diabetic patients to restore insulin secretion<sup>[3]</sup>.

Human islet transplantation shows considerable promise as a physiological means of insulin replacement for type 1 diabetes, although donor availability and progressive loss of graft function continues to hamper more widespread implementation. Pluripotent stem cells (PSCs) by definition can form all tissues of the body including insulin-secreting pancreatic  $\beta$ -cells. This potential has led many academic and industry groups to examine methods for efficient production of functional insulin-producing cells from PSCs<sup>[4]</sup>. Engineered in vitro differentiation protocols mimic known pancreatic developmental cascades, which convert undifferentiated cells,

through germ-layer specification, to restricted pancreatic endodermal progenitors. The continued development of these progenitors in vivo results in the formation of functional pancreatic endocrine cells capable of preventing and/or reversing diabetic hyperglycemia in rodent models. While the insulin-producing, antidiabetic capacity of differentiated PSCs is very promising, key questions remain about optimizing differentiation processes for functional in vitro maturation, as well as whether production of pancreatic endocrine tissue is reproducible on a clinical scale and sufficiently safe. With additional research and development in these areas, the induction of differentiation processes to yield pancreatic endocrine-like cells could yield a potentially limitless supply of functional  $\beta$ -cells capable of replacing current human islet transplantation therapies for diabetes [5].

Tremendous progress has been made in generating insulin-producing cells from pluripotent stem cells. The best outcome of the refined protocols became apparent in the first clinical trial announced, based on the implantation of pancreatic progenitors that would further mature into functional insulin-producing cells inside the patient's body [6].

Stem cells therapy is emerging as an important promising therapy for patients with type 1 diabetes mellitus. Patients with type 2 diabetes may also apply for this modality of management due to the progressive nature of the disease. Although the scientists were able to produce the  $\beta$  cell that can produce insulin in a glucose sensing manner from stem cells, many challenges are in the way namely: Malignancy, destruction of human donor embryos in producing stem cells, adverse transplant reactions, teratogenicity, phenotypic/genotypic abnormalities. Due to the rapidly evolving technology, stem cell therapy in diabetes treatment could become real shortly. Thus we thought to assess the knowledge, attitude, and practice of the doctors and medical students about the stem cells use in the treatment of diabetes.

A previous study was conducted among nurses in Malaysia [7] concluded similar results.

## SUBJECTS & METHODS

Across-sectional descriptive study conducted to assess the knowledge, attitude and practice of stem cell therapy among doctors (n=75) and medical

students (n=45) in Tabuk City Saudi Arabia during the period from April to December 2017.

Study areas and setting: The Primary Health Care Centers and the Medical College, University of Tabuk.

Sample size and technique: The simple stratified selection method was applied to choose seven Primary Health Care Centers (PHCs) in Tabuk, then the Doctors in the selected centers and the medical students in the 6<sup>th</sup> classes were approached in a 1:1 ratio.

### Study variables and data collection tools:

A structured twenty-six item questionnaire developed by the researchers after extensive literature review and was approved by a Community Medicine, a hematologist and Endocrine consultants. The self-reported questionnaire was used to collect information about:

**The knowledge**, 10 questions including type diabetes etiology, treatment, that the daily insulin injection cannot mimic the natural physiological insulin release, pancreatic transplantation, the therapeutic potential of stem cells, stem cells characteristics, the increasing interest in stem cell in  $\beta$  cell generation, the date of international stem cell project, the usual application of stem cell transplantation, and the course of stem cell transplantation in Juvenile myelomonocytic leukemia.

**The attitude**, 10 questions asking the participant about: the peak of C-peptide time after injection, the role of exogenous electric field, if conducted research or reading topics about the use of stem cell transplantation, if visited any stem cell research center, or took a course about the treatment of diabetes by stem cell transplantation.

**Practice**, six questions which inquired about: the possibility of diabetes treatment by stem cell transplantation, if  $\beta$ -cell replacement therapy via islet transplantation has had renewed interest, the possibility of existing bone marrow-derived stem cells that can differentiate into islet cells, as recently reported for hepatic cells. If the treatment of diabetes with stem cells may reduce the rejection due to the islets being from another donor for type 2 patients, if thinking that the constraints under which this is clinically possible are still too numerous to allow the broad application of this procedure to cure the disease. If thinking the cultivation of the pancreatic beta cells, limit the suffering of diabetics forever, whether the patients may not need insulin injection after the transplantation, the seriousness of complications arising from the cultivation of the

pancreatic beta cells. If there are pancreatic progenitor cells from which new islets form after birth, and if the stem cell transplantation is a potential treatment for many chronic diseases . Each question with five choices (Five points Likert scale): Strongly agree, agree, neutral, not agree, and strongly not agree. The following scoring was used to categorize participants:

- **Knowledge:** minimum = 10, maximum = 50, poor = 10 -20, fair = 21 – 30, good = 31 – 40 and excellent > 40
- **Attitude:** minimum = 10, maximum = 50, poor = 10 -20, fair = 21 – 30, good = 31 – 40 and excellent > 40
- **Practice:** minimum = 6, maximum = 30, poor = 6 - 12, fair = 13 – 18, good = 19 – 24 and excellent >24

**Data analysis**

The Statistical Package for Social Sciences IBM© SPSS© Version 20 (IBM© Corp, Armonk, NY, USA) was used for data analysis. The independent-samples t-test was used for quantitative data. Descriptive and summary statistics were carried out to describe study participants according to different characteristics. A P-value of <0.05 will be considered significant.

**Ethical consideration**

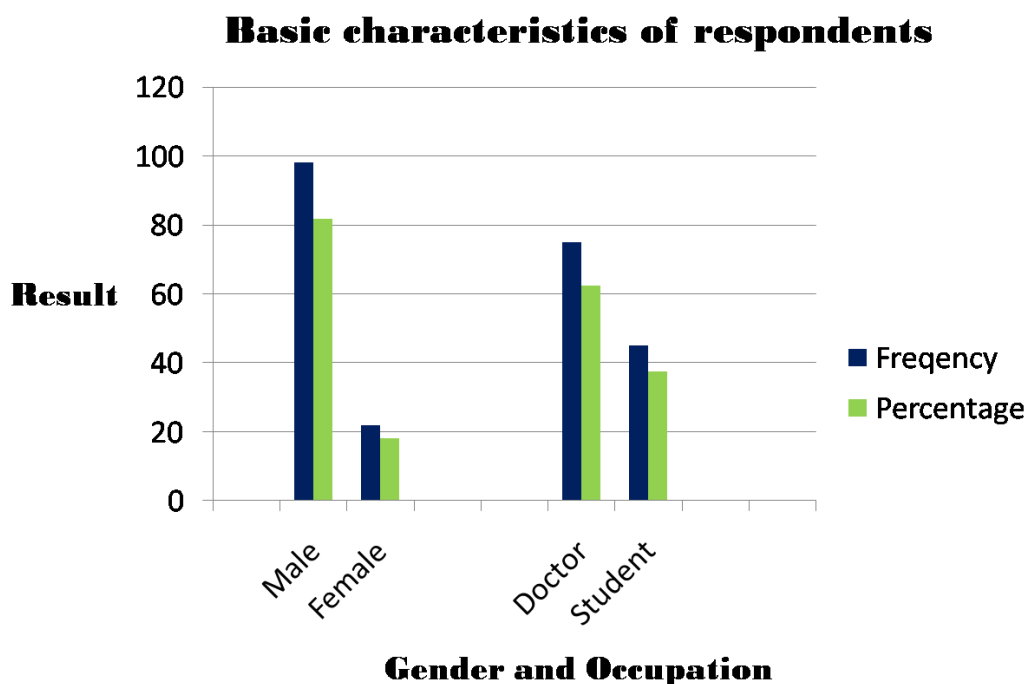
Approval was obtained from the Research Committee of the Faculty of Medicine, University of Tabuk). All the participants signed written informed consents from.

**RESULTS**

As shown in table 1 and graph 1, participants were 81.67% males, and 62.5% were residence doctors.

**Table1 and Graph 1: Basic characteristics of the respondents**

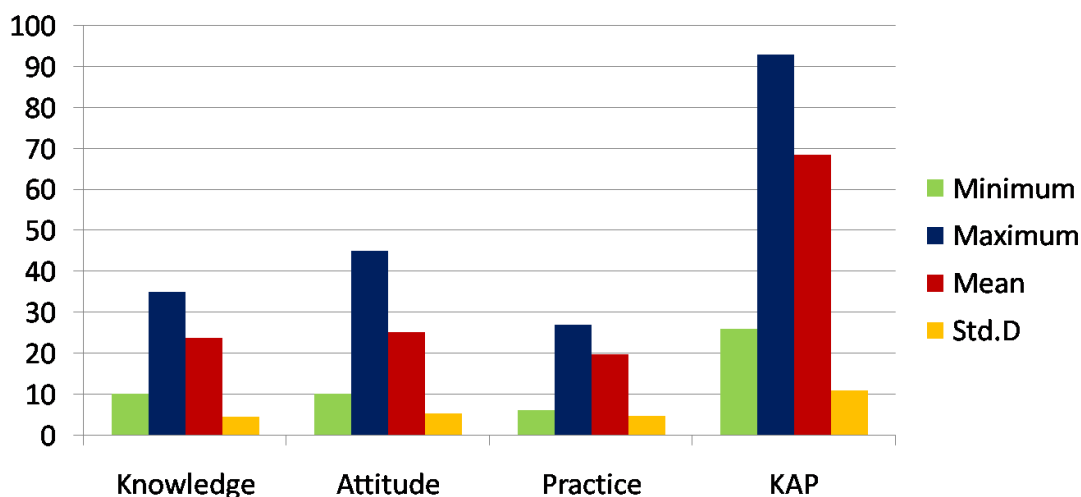
Factors	Frequency	Percentage
<b>Gender</b>		
Male	98	81.67
Female	22	18.33
<b>Occupation</b>		
Doctor	75	62.50
Student	45	37.50



**Table 2 and Graph 2: Description of knowledge, attitude, and practice among respondents**

Factor	Minimum	Maximum	Mean	Std. D
Knowledge	10	35	23.67	4.37
Attitude	10	45	25.20	5.31
Practice	6	27	19.67	4.64
KAP	26	93	68.53	10.85

**Descriptive frequency of knowledge, attitude and practice among respondents**



The knowledge about stem cell transplantation in diabetes was  $23.67 \pm 4.37$ , ranged from 10-35, the mean attitude towards stem cell transplantation score was  $25.20 \pm 5.31$ , ranged from 10-45, while the participants scored  $19.67 \pm 4.46$ , minimum 6 and maximum 27. The total overall score ranged from 26-93 with a mean of  $68.53 \pm 10.85$  as shown in table 2 and graph 2.

Table 3 and graph 3 illustrated the frequency of knowledge, attitude and practiced among respondents in which: the knowledge was poor among nearly a quarter (21%) of medical interns and medical students. The majority (76.5%) had fair knowledge. Good knowledge was reported in only a minority (2.5%), with no participant scored excellent in term of knowledge regarding stem cell therapy in diabetes mellitus. The attitude among

the participants was not different, only 0.8% were excellent, 9.2% were good, 73.1% were fair, while 16.8% had poor attitude regarding stem cell transplantation.

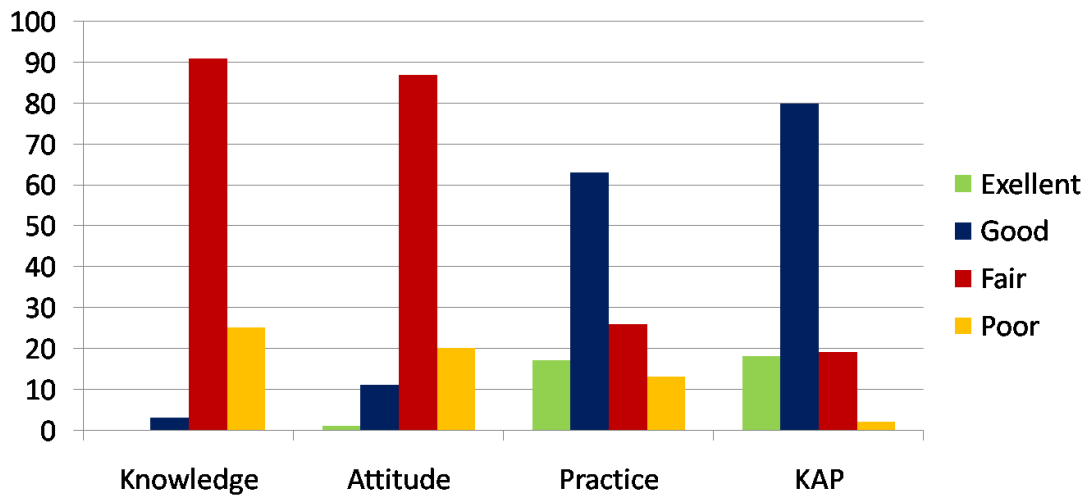
The overall score of the knowledge, practice, and attitude was as follows: more than two thirds (67.2%) were good, 15.1% were excellent, 16% and 1.7% were good and poor respectively. No significant statistical difference was evident across gender regarding the knowledge, attitude, practice, and the total score (P-values, 0.251, 0.227, 0.133, and 0.819 respectively). The knowledge, attitude, practice, and the total score were not different between doctors and medical students (P-values, 0.868, 0.970, 0.258, and 0.636 respectively) as shown in table 4 and graph 4.

**Table 3 and Graph 3: Descriptive frequency of knowledge, attitude and practice among respondents**

Factor	Excellent	Good	Fair	Poor
Knowledge	0.0 (0.0%)	3 (2.5%)	91 (76.5%)	25 (21.0%)
Attitude	1 (0.8%)	11 (9.2%)	87 (73.1%)	20 (16.8%)
Practice	17 (14.3%)	63 (52.9%)	26 (21.8%)	13 (10.9%)
KAP	18 (15.1%)	80 (67.2%)	19 (16.0%)	2 (1.7%)

Knowledge minimum = 10, maximum = 50, poor = 10 -20, fair = 21 – 30, good = 31 – 40 and excellent > 40  
 Attitude minimum = 10, maximum = 50, poor = 10 -20, fair = 21 – 30, good = 31 – 40 and excellent > 40  
 Practice minimum = 6, maximum = 30, poor = 6 - 12, fair = 13 – 18, good = 19 – 24 and excellent >24

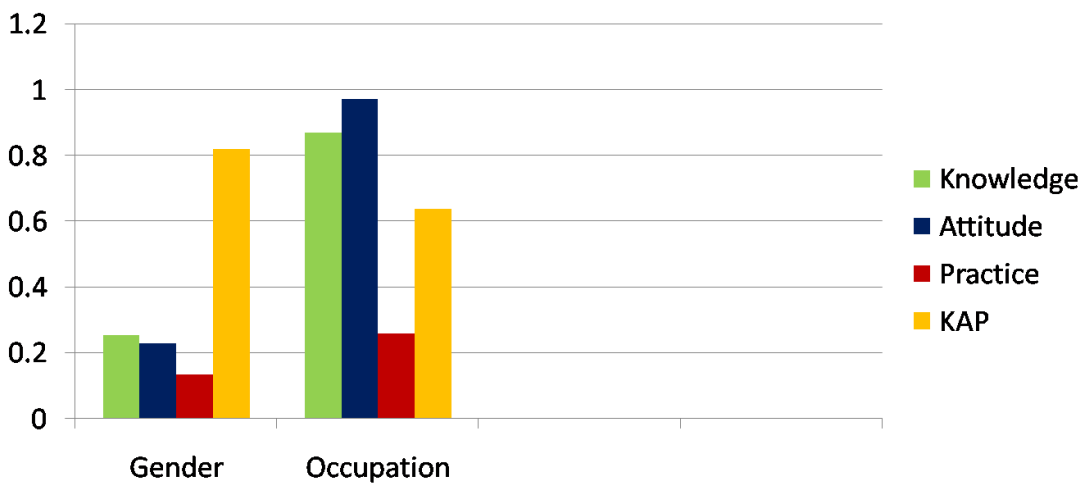
**Descriptive frequency of knowledge, attitude and practice among respondents**



**Table 4 and Graph 4: Bivariate analysis of gender and occupation with knowledge, attitude and practice**

Factor	Knowledge	Attitude	Practice	KAP
Gender	P = 0.251	P = 0.227	P = 0.133	P = 0.819
Occupation	P = 0.868	P = 0.970	P = 0.258	P = 0.636

**Bivariate analysis of gender and occupation with knowledge, attitude and practice**



## DISCUSSION

Stem cell therapy is promising in patients with diabetes mellitus. The current survey was conducted to assess the knowledge, practice, and attitude of final class medical students and doctors regarding stem cell use in diabetes. The present findings showed that the knowledge of the participants is poor to moderate. A previous study conducted among nurses in Malaysia<sup>[7]</sup> concluded similar results. The unacceptable level of knowledge among doctors and final medical students could be due to high specialty of the topic and a new advanced trend. Further possible explanations could be that it was touched more superficially in the college curriculum and lack of continuous reading and update in a busy real medical life of the Primary Health Care Physicians. Previous researchers attributed the poor knowledge and attitude towards stem cell transfusion to religious issues<sup>[8,9]</sup>.

In the Kingdom of Saudi Arabia, the art of stem cell transplantation is widely used for various diseases, so the moderate to poor knowledge is unlikely due to religious believes.

In the present study, the attitude although still low but better than the current knowledge and it is encouraging in that the participants may improve their knowledge about this very growing field. Stem cell transplantation is an area of ethical and scientific debate, so the current questionnaire and the questions used could add more to the poor knowledge observed among the study group. The lack of exposure to stem cell therapy in our region could partly explains this sort of knowledge. It is interesting to note that no significant differences were evident between the doctors and medical students regarding the knowledge, attitude, and practice regarding stem cell transplantation which support the lack of exposure. Similarly, Lye Jee Leng et.al observed the lack of clinical experience effect regarding knowledge about stem cell therapy<sup>[7]</sup>. Previous literature<sup>[7, 10]</sup> attributed the poor knowledge regarding stem cell transplantation to religious believes because they assessed the attitude towards experiments on the fetus which was not included in the current research.

The limitations of the study are the reliance of self-administered questionnaire, and the small size

of the study group, so generalization cannot be insured.

## CONCLUSION

The present findings indicated that the knowledge, attitude, and practice were sub-optimal among the final class medical students and doctors in Tabuk, Saudi Arabia, with no differences between the two groups. More effort is needed at Colleges to upgrade the medical student's knowledge. The adoption of interventional educational strategies in the Primary Health Care Centers is needed.

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