



Figure 1: Level of Knowledge of care givers about T1DM, Addis Ababa,Ethiopia,2016.

4.4. Factors affecting the level of knowledge of caregivers

As noted from the result of bivariate and multivariate analysis, sex, residence, educational level, family income, attending DM education previously and psychological problem were variables which showed significant association with the level of knowledge of care givers. (Table 3)

Other variables such as age, marital status, religion, ethnicity, employment status, the number of children in the family, the presence of another child with diabetes didn't show any association with the level of knowledge (Table 3). Duration of diabetes in years showed associations with the level of knowledge at the bivariate level, but when the cofounders were controlled it was not associated with the knowledge level of the caregivers. (Table 3)

Table 3: Bivariate and multivariate logistic regression analysis of level of Knowledge Addis Ababa, Ethiopia, 2016(N=149).

LEVEL OF KNOWLEDGE				
Variables	Good Knowledge	Poor Knowledge	COR(95% C.I)	AOR(95% C.I)
Sex				
Female	46	43	2.0(1.2 , 3.9)	3.2 (1.3 , 7.9)*
Male	21	39	1.0	1.0
Residence				
Urban	60	56	3.9(1.6 , 9.9)	3.1 (1.1 , 8.9)*
Rural	7	26	1.0	1.0
Education level				
Well educated	17	8	3.1(1.3 , 7.8)	4.7 (1.4 , 15.5)*
Less educated	50	74	1.0	1.0
Family income				
High income	40	19	4.9(2.4 , 9.9)	6.0 (2.4 , 14.9)**
Poor income	27	63	1.0	1.0
Attending DM Education before				
Yes	46	26	4.7(2.4 , 9.5)	5.5 (2.3 , 13.3)**
No	21	56	1.0	1.0
Encountered Psychological problem				
No	64	61	7.3(2.1 , 25.9)	9.1 (2.1 , 41.4)*
Yes	3	21	1.0	1.0

*P value is significant at P<0.05

**p value is significant at P<0.001

5. Discussion

In this study, more than half (55%) of the caregivers had poor level of knowledge. This is higher than the study finding of Egypt which was 38 %. This difference may be related to different study setup and socio-economic status of the care givers. Finding of this study is consistent with the study finding of Saudi and Tanzania which mentioned that mothers had limited knowledge about diabetes mellitus [10, 19]. This study was also almost comparable with the study from Poland which stated that majority (56.7 %) of families supporting the patient had poor knowledge about the disease [12].

In this study, caregivers' mean knowledge was 10.11. This is lower than the study finding of Iran which was 17.72 [20]. This might be attributed to difference in socio-economic status as well.

Sex of the caregivers showed significant association with the level of their knowledge. Female caregivers were more likely knowledgeable than male caregivers [AOR= 3.2; 95% CI (1.3- 7.9)]. This might be due to the reason that women (mothers) were more dedicated to the care of their children than men (fathers) so that they spent more time in order to figure out what is best for their child and in the mean time they became more knowledgeable than male caregivers. Similar findings were also observed in earlier studies conducted in Tanzania [12] and Brazil [21]. In other similar studies, sex was not mentioned as a factor that can affect knowledge level of caregivers. It might be due to the reason that those studies focused only on one sex, which is women (mothers); men (fathers) were not included in these studies [16, 22].

This study showed that caregiver's residential place was significantly associated with the level of knowledge they had. Caregivers who reside in urban were more knowledgeable than those who live in rural [AOR= 3.1; 95% CI (1.1- 8.9)]. This may be partly caregivers in urban areas were closer to information compared to those from rural ones that makes it easy for them to get education and training from the health facilities and other sources. As a result, they became more knowledgeable compared to the rural ones. It is consistent with the study conducted previously in Egypt [22].

In this study, education level of the care givers were found highly associated with level of knowledge [AOR = 4.7; 95% CI (1.4 - 15.5)]. Similar findings were observed in earlier studies conducted in Israel, Kingdom of Saudi and Egypt [15, 16, 22]. A study done in USA also stated

that literacy and numerical skills of caregivers significantly influence glycemic control of their children with type 1 diabetes [23], which implies their level of education affect their knowledge level since knowledge level and glycemic control are directly related. This might be due to the fact that as their level of education increases, they became more aware of the disease through reading and searching more about the disease.

In this study, family income was one of the variables that were highly associated with level of knowledge of the caregivers [AOR= 6.0; 95% CI (2.4 - 14.9)]. This finding is consistent with studies done in Bosnia Herzegovina, Kingdom of Saudi, Iran and Egypt [14, 16, 20, 22]. All these studies concluded that the higher the income the higher the knowledge level.

Finding from this study showed that attending diabetic education previously was one of the major variables that could affect the knowledge of the caregivers. It revealed that attending diabetic education previously had significant association with the level of knowledge [AOR= 5.5; 95% CI (2.3 - 13.3)]. It is consistent with findings that came from different countries. Studies done in Kingdom of Saudi, Egypt and USA indicated that statistically significant association was observed between attending workshop about DM and knowledge and practices of caregivers [10, 22, 23].

According to this study, the strongest predictor of knowledge level of the care givers was absence of psychological problem. Presence of parental psychological problems, specifically anxiety and depression, had a highly significant effect on the level of knowledge [AOR= 9.1; 95% CI (2.1 - 41.4)]. It was consistent with a study done in USA, which mainly focused on depression [24]. In the contrary, other study that was done in another state of USA revealed that disease related parenting stress in caregivers of younger children is an indicator of greater

adherence behaviors, as these parents often take on more responsibility for disease management [25].

6. Conclusion

In conclusion, most of the caregivers (55%) have knowledge deficit towards T1DM. This study also found that sex, place of residence, educational level, family income, attending diabetic education previously and presence of psychological problem were variables that showed a statistical significant association with the level of knowledge of caregivers.

Knowledge is a key factor for the good management of diabetes and prevention of its complications. This study informs policy/decision makers and concerned institutions on factors associated to the knowledge of care givers about type 1 diabetes mellitus. It is also beneficial for health professionals, especially for those who work on child health, to build up knowledge and implement evidence based practice on areas related to care of diabetic children and its management, and organizes effective education programs. Furthermore, the study suggested that giving ongoing trainings and preparing different workshops for the caregivers is beneficial for improving their level of knowledge with ultimate goal of bringing better outcome of children with T1DM.

Ethics approval and consent to participate

To conform the Declaration of Helsinki (1964) and Population Screening Act, Addis Ababa University Institutional Review Board approved the study. Participation was voluntary, and information was collected anonymously after obtaining written consent from each respondent. Confidentiality of data was ensured throughout the study.

List of abbreviations

AOR: Adjusted Odds Ratio

COR: Crude Odds Ratio

DM: Diabetes Mellitus

HbA1C: Glycosylated hemoglobin level

IDF: International Diabetic Federation

JDM: Juvenile Diabetes Mellitus

SPSS: Statistical Package for Social Sciences

T1DM: Type 1 Diabetes Mellitus

WHO: World Health Organization

Conflict of interest

The authors declare no conflict of interest, financial or otherwise

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References

1. American Diabetes Association (ADA), Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. 2003.
http://care.diabetesjournals.org/content/28/suppl_1/s37. Accessed 16 Feb, 2016.
2. IDF. IDF Diabetes Atlas. 7th ed, Brussels. 2015.
<https://www.slideshare.net/DRVENEREO/versin-previa-del-atlas-idf-2015>. Accessed 29 Oct 2015.
3. Mathers CD, Loncar D. Projections of global mortality and burden of disease from 2002 to 2030. PLoS Med, 2006; 3(11):e442.
<http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0030442>. Accessed 29 Oct 2015.
4. Kapur A, Mohan V. Awareness and knowledge of diabetes in Chennai - The Chennai urban rural epidemiology study [CURES - 9]. J Assoc Physicians India. 2005;53:283–7.
5. IDF. IDF Africa Region. 2018. <https://www.idf.org/our-network/regions-members/africa/members/9-ethiopia.html>. Accessed 16, Feb, 2018.
6. WHO. World Health Ranking, Live Longer Live Better. 2014.
<http://www.worldlifeexpectancy.com/ethiopia-diabetes-mellitus>. Accessed 16, Feb, 2016
7. American Diabetes Association. National diabetes statistics report, 2014. Estimates of diabetes and its burden in the epidemiologic estimation methods. Natl Diabetes Stat Rep. 2014; 2009–12.

8. Elrayah H, Eltom M, Bedri A, et al. Economic burden on families of childhood type 1 diabetes in urban Sudan, *Diabetes Res Clin Pract.* 2005; 70(2):159-65.
9. Danaei G, Finucane MM, Lu Y, Singh GM, Cowan MJ, et al. National, regional, and global trends in fasting plasma glucose and diabetes prevalence since 1980: systematic analysis of health examination surveys and epidemiological studies with 370 country-years and 2.7 million participants. *Lancet.* 2011; 378:31-40. DOI: [10.1016/S0140-6736\(11\)60679-X](https://doi.org/10.1016/S0140-6736(11)60679-X).
10. Megeid FY, El-Sayed MM. Health education intervention improves knowledge, attitude and practices of mothers of insulin dependent diabetes mellitus. *World Appl Sci J.* 2012; 17(11):1398-1404.
11. Wherrett D, Huot C, Mitchell B, et al. *Type 1 Diabetes in Children and Adolescents.* 2013. [http://www.canadianjournalofdiabetes.com/article/S1499-2671\(13\)00043-9/fulltext](http://www.canadianjournalofdiabetes.com/article/S1499-2671(13)00043-9/fulltext). Accessed 21 Oct 2015.
12. Abramczyk A. The family knowledge about the disease and complications risk among diabetic patients-in Poland. *J Data Mining Genomics Proteomics.* 2013; DOI:10.4172/2153-0602.1000142
13. Stallwood L. Relationship between caregiver knowledge and young children with diabetes. *J Spec Pediatr Nurs.* 2006;11(3):158–65.
14. Tahirovic H, Toromanovic A. Glycemic control in diabetic children: role of mother's knowledge and socioeconomic status. *Eur J Pediatr.* 2010; DOI: 10.1007/s00431-010-1156-0.

15. Florian V, Elad D. The impact of mothers' sense of empowerment on the metabolic control of their children with juvenile diabetes. *J Pediatr Psychol*. 1998; 23 (4):239-47.
16. Al-odayani AN, Alsharqi OZ, Eddin A, et al. Children's glycemic control : Mother's knowledge and socioeconomic status. *Global J of Health Science*. 2013;5(6):214–26.
17. Al-qazaz HK, Hassali MA, Shafie AA, Sulaiman SAS, Sundram S. The 14-item Michigan Diabetes Knowledge Test : translation and validation study of. 2010;27(6):238–42.
18. Michigan Diabetes Research Center: Tools for Health Professionals.
http://diabetesresearch.med.umich.edu/Tools_SurveyInstruments.php. Accessed 25 Dec 2015
19. Noorani M. Factors associated with glycaemic control in children and adolescents with type 1 diabetes mellitus at Muhimbili National Hospital, Dar Es Salaam. Dar Es Salaam: Muhimbili University of Health and Allied Sciences; 2011.<http://ihi.eprints.org/id/eprint/929>. Accessed 12 Nov 2015.
20. Soheilipour F, Jolfaei AG, Khodapanahandeh F, et al. The relationship between maternal awareness, socioeconomic situation of families and metabolic control in children with type 1 diabetes melitus in an Iranian populatioJ Compr Ped. 2015; DOI: 10.17795/compreped-26924.
21. Rodrigues P, et al. Knowledge of diabetes mellitus : Does gender make a difference ? *Osong Public Health Res Perspect*. 2014;5(4): 199-203.
22. Shenouda MS, Ahmad MA, Mohammed MD. Knowledge and Practices of Juvenile Diabetes' Caregivers at Home -in Minia University Hospital. Cairo: The Medical J of Cairo University. 2012.

23. Hassan K, Heptulla RA. Glycemic control in pediatric type 1 diabetes: Role of caregiver literacy. 2010; <http://dx.doi.org/10.1542/peds.2009-1486>. Accessed 20 Oct 2015
24. Eckshtain D, Ellis D a., Kolmodin K, Naar-King S. The effects of parental depression and parenting practices on depressive symptoms and metabolic control in urban youth with insulin dependent diabetes. *J Pediatr Psychol*. 2010;35(4):426–35.
25. Cousino MK, Hazen RA. Parenting Stress among Caregivers of Children with Chronic Illness : A Systematic Review. *J Pediatr Psychol*. 2013; 38(8);809-28.

